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ENVIRONMENTAL ASSESSMENT BOARD



ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 112

DATE: Monday, February 24, 1992

BEFORE:

HON. MR. JUSTICE E. SAUNDERS Chairman

DR. G. CONNELL Member

MS. G. PATTERSON Member

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ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act,
R.S.O. 1980, c. 140, as amended, and Regulations
thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro
consisting of a program in respect of activities
associated with meeting future electricity
requirements in Ontario.

Held on the 5th Floor, 2200
Yonge Street, Toronto, Ontario,
on Monday, the 24th day of February,
1992, commencing at 10:00 a.m.

VOLUME 112

B E F O R E :

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MS. G. PATTERSON Member

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R. CUYLER		ON HIS OWN BEHALF

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1 ---Upon commencing at 10:00 a.m.

2 THE REGISTRAR: Please come to order.

3 This hearing is now in session. Be seated, please.

4 ARTHUR RAYMOND EFFER,
5 CHARLES WILLIAM DAWSON,
6 JAMES RICHARD BURPEE,
7 GARY NEIL MEEHAN,
8 JOHN DOUGLAS SMITH,
9 AMIR SHALABY; Resumed.

10 THE CHAIRMAN: Mr. Greenspoon.

11 MR. GREENSPOON: Thank you, Mr. Chairman.

12 Perhaps firstly, Mr. Chairman, I should
13 identify the map that I have put up on the back of one
14 of Hydro's -- actually I didn't ask permission to use
15 their piece of styrofoam. I hope there is no problem
16 with that. It was very handy. It's a map of the North
17 Channel from Meldrum Bay to Clapperton Island and it's
18 chart No. 2299 from the Canadian Hydrographic Service
19 in Ottawa.

20 THE CHAIRMAN: Perhaps we should mark it
21 as an exhibit then. Just give it number for now.

22 MR. GREENSPOON: Fine

23 THE REGISTRAR: 481.

24 ---EXHIBIT NO. 481: Map of the North Channel. Chart
25 No. 2299.

26 MR. GREENSPOON: I think when I do refer
27 to it, given the scale, the maps are quite large, it

1 probably won't be necessary for you to refer to it.
2 But if you ever go sailing on the North Channel, it
3 will tell you where all the rocks are.

4 CROSS-EXAMINATION BY MR. GREENSPOON:

5 Q. Now Mr. Shalaby, I believe you were
6 the first witness to speak -- no, I'm sorry, it's Dr.
7 Effer.

8 Dr. Effer, you were talking about the
9 design and construction branch. That's the branch that
10 you are with?

11 DR. EFFER: A. That is correct.

12 Q. But your particular field is the
13 environmental field under that branch?

14 A. Yes, that is correct.

15 Q. So does it have its own name within
16 that branch?

17 A. The department is called the
18 Environmental Studies and Assessments Department.

19 Q. How many people are in that division,
20 in that branch or that department?

21 A. In the environmental studies and
22 assessments department, there are approximately 42
23 regular staff. We usually have students and some small
24 number of temporary staff and then other manpower is
25 provided by consultants.

1 Q. Now you said that your department is
2 involved in generation-related environmental issues.

3 A. Correct.

4 Q. Not transmission?

5 A. That is correct.

6 Q. So just to clarify for me, who is
7 responsible for the environmental impacts or the
8 environmental issues with respect to transmission?

9 A. There is a design and development
10 division, generation and a design and development
11 division, transmission; and within that latter
12 division, there are groups who are involved with the
13 environmental aspects of transmission.

14 Q. Now, correct me if I am wrong. My
15 understanding is that design and construction is
16 nuclear and fossil.

17 A. It is all forms of generation,
18 including hydraulic.

19 Q. And hydraulic.

20 A. And other generation, yes.

21 Q. Now are you head of the department?

22 A. I was until six weeks ago.

23 Q. Who is the now head?

24 A. The acting manager is Mr. R.J.

25 Malvern, M-a-l-v-e-r-n.

1 Q. And you had been the head for how
2 many years prior to that?

3 A. I think I was the manager for about
4 14, 15 years.

5 Q. So then your knowledge extends to
6 environmental considerations of both nuclear and fossil
7 and hydraulic, all three?

8 A. Yes.

9 Q. And some of the concerns in nuclear
10 are related to the concerns that we have heard about in
11 fossil, particularly the thermal cooling?

12 A. That is correct, yes.

13 Q. Now, I wanted to ask you about what
14 role your department -- your department, that's what I
15 would call it.

16 A. Yes.

17 Q. What role does your department play
18 in the choice of generation based on environmental
19 impacts.

20 A. During the selection of generation,
21 when we consider -- I'm sorry, I'm trying to -- could
22 you be a little more specific about the choice of
23 generation.

24 Q. Sure. In your evidence you said that
25 your branch is involved right at the initial stage, the

1 conceptual stage. And I wondered given that they were
2 involved right from the beginning, what impact or what
3 role does your department play on choosing between
4 hydraulic, nuclear or fossil. Do you have any role to
5 play -- based on the environmental impacts, do you make
6 recommendations to the planning department that this is
7 the way we should go?

8 A. We are involved in the earliest
9 phases, in the concept phase, and we get involved in
10 advising system planning department and our own system
11 planning division and our own division on the
12 environment aspects which lead to the selection of a
13 particular generation.

14 Q. Have you ever found yourself in a
15 position recommending to anybody in another department
16 the type of generation to choose?

17 A. The generation choice is brought
18 about by a combination of many factors including
19 environmental. We contribute our views from an
20 environmental point to that overall selection.

21 Q. Does anybody from your department sit
22 on the planning committee or work in the planning
23 department of Ontario Hydro?

24 A. I'm sorry, I don't believe I know
25 what you mean by planning department.

1 Q. Well, maybe there is no such thing as
2 planning department at Ontario Hydro. I thought there
3 was a group of planners that planned for the future,
4 and we were going to hear about that in Panel 10?

5 A. There are planning groups in several
6 areas.

7 Q. I don't know whether you are not
8 understanding my question, but I will try it one more
9 time.

10 Is there anybody in your department who
11 is in the role of advising between two particular
12 choices of generation? Mr. Shalaby wants to answer
13 that.

14 MR. SHALABY: A. Maybe I will add to
15 that. The group that, for example, put together the
16 Demand/Supply Plan included staff from Dr. Effer's
17 department in a steering capacity and a working
18 capacity. If that's what you are referring to as a
19 committee. I don't know what you mean by committee or
20 department.

21 Q. Maybe the question is better left to
22 Panel 10. I didn't want to really get into too much
23 detail. Perhaps I will understand it better during
24 Panel 10.

25 Now, you said that you had a role to play

1 in the conceptual phase of this process, but you
2 indicated that upon commissioning you hand over your
3 duties to the operator.

4 DR. EFFER: A. That is correct. To the
5 operating divisions.

6 Q. To the operating divisions.

7 And I am wondering what role you play in
8 monitoring during the operation of the facility?

9 A. Those studies, longer term studies
10 such as those in the aquatic environment which start
11 out several years before the commissioning date,
12 usually three or four years, are initiated within my
13 old department; and to ensure continuity of those
14 longer term studies, we still retain some of the
15 overall direction in the carrying out of those studies
16 into the commissioning and into the operating phase in
17 order to complete the overall study.

18 Q. But right now let's take, I think it
19 was Mr. Meehan who went through -- was it you Mr.
20 Meehan who went through the list of the fossil plants
21 that we have in operation now?

22 MR. MEEHAN: A. Yes, it was I.

23 Q. And the oldest one is?

24 A. The oldest fossil station?

25 Q. Yes.

1 A. It would be J. Clark Keith near
2 Sarnia -- near, Windsor, sorry.

3 Q. But it is mothballed?

4 A. It is mothballed, yes.

5 Q. So what is the oldest operating
6 station?

7 A. Lakeview in Mississauga is our oldest
8 station.

9 [10:10 a.m.]

10 Q. So, Dr. Effer, Lakeview, what
11 monitoring do you do of Lakeview, your department?

12 DR. EFFER: A. Virtually nothing.

13 We participate in special studies and
14 contribute to special studies as is required, but the
15 main control will be the operating divisions.

16 Q. What about decommissioning of these
17 fossil plants, do you play any role there, your
18 department?

19 A. We have been active in preparing
20 decommissioning guidelines in a generic sense for older
21 plants.

22 Q. But the actual decommissioning of a
23 specific site, you don't go in, your people don't go in
24 and participate in the environmental impacts of that
25 decommissioning?

1 A. We would do if it were being
2 decommissioned, but I'm not aware that we have actually
3 contributed to a decommissioning, previous ones.

4 Q. Are you going to be giving evidence
5 in Panel 9 or do you know the answer to that question?

6 A. I am not on the No. 9 panel.

7 Q. All right. Is there somebody else
8 from your department on that panel?

9 A. Yes, there is.

10 Q. I see. Okay.

11 Now, if you could turn to Appendix A of
12 Exhibit 344, it's the last tab, page Al. I see your
13 copy doesn't have the tabs. Page 1A, which is the page
14 after the index.

15 Now, I was asking you about this with Mr.
16 Howard's permission, you see number .2 -- what I meant,
17 Mr. Howard, was I asked you permission to speak to Dr.
18 every. You looked puzzled when I said that.

19 On point 2:

20 The existing corporate policy on the
21 environment watts developed in the 70s
22 and is being revised. In 1990 a
23 framework was developed to finalize
24 Ontario Hydro's environmental principles
25 which were drafted in '89. The

1 principles will express fundamental
2 values on environmental leadership,
3 decision-making, wise resource use,
4 consultation and responsibility. The
5 framework provides a basis for a Green
6 Paper to be issued in 1991.

7 Now, I asked you last Monday or Tuesday,
8 I think just before the lunch hour, if you knew
9 anything about this Green Paper, and you wondered if
10 perhaps a government Green Paper. Have you since found
11 out anything about this Green Paper? Is it in fact a
12 Government of Canada Green Paper?

13 A. No, it is not. The Corporation,
14 Ontario Hydro, has been carrying out some further work
15 on developing what we call environmental principles,
16 and to the best of my knowledge the exercise has not
17 been completed, but these, when they are completed,
18 when this exercise is completed, they will be included
19 in this Green Paper which you asked about.

20 Q. So, this Exhibit 344 came out in
21 September 1991.

22 THE CHAIRMAN: I wonder if anyone in the
23 panel could be more specific about that answer. Is
24 there a document that is in the process of being
25 prepared? I think we should have it, if it is.

1 MR. GREENSPOON: Q. Is there a Green
2 Paper? This came out in September 1991 and it said the
3 framework provides a basis for a Green Paper to be
4 issued in 1991. Well, it's 1992.

5 DR. EFFER: A. It has not been issued,
6 to my knowledge.

7 THE CHAIRMAN: Does anyone have any idea
8 when it will be issued?

9 DR. EFFER: I can't put a firm date on
10 it. I don't know.

11 MR. GREENSPOON: Q. Do you know in fact
12 whether somebody is working on this Green Paper?

13 DR. EFFER: A. Yes, I participated in
14 interviews that provided information that's being fed
15 into these environmental principles which will
16 constitute a large part of the Green Paper.

17 Q. But when I asked you last week about
18 the Green Paper you didn't know what I was talking
19 about.

20 A. I didn't know that the environmental
21 principles were being developed and brought out under
22 the name Green Paper.

23 Q. So who would be issuing the Green
24 Paper?

25 A. The group that is involved in this is

1 the environment division?

2 Q. The environment division?

3 A. Yes.

4 Q. And that's a different division than
5 you are in?

6 A. This is a division which was formed
7 about two years ago and is a division which is
8 primarily concerned in -- one of its function is to
9 deal with corporate policy matters on the environment.

10 Q. Do we have any materials from them?

11 MR. SHALABY: A. We have lots of
12 exhibits from the environment division.

13 Q. Pardon me?

14 A. They are several exhibits from the
15 environment division on the record.

16 Q. And these are exhibits that are from
17 this division that was formed two years ago?

18 A. Yes.

19 Q. What are those exhibits? Do you
20 know, Mr. Shalaby. If you don't know I don't want you
21 to --

22 A. Oh, I know, yes. Something this easy
23 I will not pass up.

24 Exhibits 19, 20, 21 and 22.

25 Q. These are the State-of-the-

1 Environment reports?

2 A. That's correct.

3 Q. Okay. Those came out in '88?

4 A. '88, '89 and '90.

5 Q. And '90.

6 A. Right.

7 Q. Now, is this the division that Dr.

8 Effer is talking, is this a division that was formed as
9 a result of the restructuring of Hydro that Mr.

10 Campbell filed in a chart form?

11 A. It was created as a restructuring of
12 Hydro but maybe not the most recent restructuring.

13 Q. Not the most recent. Not as a result
14 of the new government, the new chairman?

15 A. That's correct.

16 Ms. Ryan who was here on Panel 2 is a
17 member that have division, or was a member of that
18 division at the time.

19 Q. All right. Now, when this Green
20 Paper comes out, we can be sure, Dr. Effer, that we
21 will see it; is that correct?

22 MR. HOWARD: If he doesn't know the
23 answer, I do, yes.

24 MR. GREENSPOON: That sounds like an
25 undertaking from counsel. I think that is fine with

1 me.

2 Q. Moving on to point 3, Dr. Effer --

3 THE CHAIRMAN: They would be in
4 considerable trouble if they didn't let us have it.

5 MR. GREENSPOON: Since it is an
6 environmental assessment that's probably true.

7 Q. Moving on to dot 3, it states, that
8 section states the three basic emission control
9 principles listed in order of preference. I wonder if
10 you could read those. Basically elimination, reduction
11 and dilution. And it says that those three principles
12 are in order of preference.

13 The first environmental principle is to
14 eliminate emissions where practical; reduction, it
15 says, where emissions are unavoidable. The second
16 principle is to reduce them to acceptable levels to
17 society, and the third is for residual discharges of
18 treated effluents, sufficient dilution is the
19 principle.

20 Do you agree with those three principles?
21 Are those principles that you use in your evaluations?

22 DR. EFFER: A. Yes.

23 Q. And would it be fair to say those are
24 guiding principles for Ontario Hydro?

25 A. Yes.

1 Q. And in that order of preference?

2 A. Yes.

3 Q. Now, if you just turn the page to A2,

4 Dr. Effer, August 1990, do you see that paragraph?

5 Bullet in August 1990?

6 A. Oh, page A2.

7 Q. Page A2. In August 1990 the Ontario

8 Ministry of the Environment issued the Clean Air

9 program as a draft regulation for a 180-day comment

10 period.

11 Have you commented on that draft

12 regulations?

13 A. Yes, we have.

14 Q. I wonder if I could have those

15 comments?

16 A. I believe that --

17 Q. Has that been filed?

18 A. That request was made before, and I

19 think it was an interrogatory.

20 Q. Well, I don't need the answer right

21 now, but if you could provide me with that?

22 A. Yes.

23 MR. GREENSPOON: Should that form a

24 transcript undertaking, Mr. Chairman?

25 THE CHAIRMAN: It may be fairly readily

1 discovered it's in an interrogatory, but we can put it
2 down so we won't lose track of it.

3 478, is it?

4 THE REGISTRAR: 478.12.

5 ---UNDERTAKING NO. 478.12: Ontario Hydro undertakes to
6 provide a letter and attachments on the
7 Ontario Ministry of the Environment Clean
Air program draft regulations.

8 DR. EFFER: We have a letter to the
9 Minister with some attachments, will that suffice,
10 giving general and slightly more detailed criticisms?

11 MR. GREENSPOON: Q. That will be fine.
12 Is there data behind that that I might...

13 DR. EFFER: A. I think you will find
14 this sufficient.

15 [10:22 a.m.]

16 Q. Okay. Thank you.

17 I wanted to ask you. You said there were
18 42 people in your department. How many people are in
19 this environmental division or is this a more senior
20 division with less people?

21 A. The purpose of the division is really
22 to coordinate the -- apart from developing policies, to
23 ensure that the line environmental divisions are
24 supplied with appropriate studies which they will carry
25 out as a line function --

1 Q. Excuse me, yours would be a line --

2 A. Yes, I would classify my department
3 as a line function. The environment division is
4 relatively small. I believe it's probably about ten or
5 12 people, regular staff.

6 Q. Will we be hearing any more evidence
7 in this hearing from them?

8 A. I am not aware that any other panel
9 has members from the environment division.

10 MR. SHALABY: A. There may be others
11 coming in. The membership of subsequent panels are
12 still being worked out.

13 Q. All right. I don't want to suggest
14 who you should call or who you shouldn't.

15 Now these effects reports that you refer
16 to in your evidence, are they within -- they are in the
17 early stages, I gather, of the commencement of
18 operation of any particular facility?

19 DR. EFFER: A. Yes, we usually publish
20 them and send them to the Ministry of the Environment
21 usually about three to four years after the operation
22 of the plant.

23 Q. So we haven't got one of those -- or
24 I shouldn't say we. You haven't produced one of those
25 for quite some time?

1 A. That's not correct.

2 Q. Okay.

3 A. We have produced so-called effects
4 reports for Pickering "A" and Atikokan, and they have,
5 I believe, been supplied already to the Ministry of the
6 Environment.

7 Q. Pickering "A", that is a nuclear
8 facility?

9 A. Yes, that's correct.

10 Q. And Atikokan?

11 A. It's a lignite burning --

12 Q. Lignite, which is Saskatchewan coal?

13 A. Yes.

14 Q. So Atikokan's effects report, when
15 was Atikokan opened, Mr. Meehan? Or do you know the
16 answer, Dr. Effer or Mr. Burpee.

17 MR. BURPEE: A. November 15, 1985, it
18 went into commercial service.

19 Q. And when would the effects report
20 have been released?

21 DR. EFFER: A. Very recently. I think
22 in the last year.

23 Q. And is that an exhibit to these
24 hearings?

25 A. No.

1 Q. And can I get a copy of that?

2 A. Yes.

3 THE CHAIRMAN: That's 478.

4 THE REGISTRAR: .13.

5 ----UNDERTAKING NO. 478.13: Ontario Hydro undertakes to
6 provide a copy of the Atikokan effects
report.

7 MR. GREENSPOON: Q. Mr. Shalaby, now you
8 said -- maybe you should refer to the transcript,
9 Volume 108, page 18861, line 15.

10 You don't have to turn back but I will
11 just read Mr. Howard's question:

12 Mr. Shalaby, since you have been quiet
13 so far, would you undertake, please, just
14 to outline for the Board, in general
15 terms, the topics which we propose to
16 cover in evidence.

17 THE CHAIRMAN: Sorry, Mr. Greenspoon,
18 18861, I don't think is the right reference.

19 MR. GREENSPOON: I just referred back to
20 the question which is prior to that. Perhaps I should
21 give that reference, I'm sorry.

22 THE CHAIRMAN: Even that doesn't seem to
23 be right.

24 MR. GREENSPOON: Bottom of 18859. "Thank
25 you, Mr. Smith."

1 THE CHAIRMAN: Oh yes, thank you. I have
2 got it.

3 MR. GREENSPOON: Q. Mr. Shalaby, since
4 you have been quiet so far, would you
5 undertake, please, just to outline for
6 the Board, in general terms, the topics
7 which we propose to cover in evidence in
8 this panel.

9 So you were giving a general overview
10 about fossil fuels and alternatives at the time you
11 answered the question. And later when you are talking
12 about fossil options on page 18861, line 15, you say:

13 We will focus in providing
14 characteristics of several new technology
15 options in the area of alternatives as
16 well as fossil options that could be used
17 for meeting future electricity demand.

18 Now my question is: This demand, this
19 future electricity demand that you are referring to,
20 when is that?

21 MR. SHALABY: A. Over the next 15, 20,
22 25 years.

23 Q. 15, 20, 25 years?

24 A. Up to that period and including
25 tomorrow and the day after, the future starts right now

1 and goes on to 25 years. Is that what you --

2 Q. So it starts tomorrow.

3 A. Yes, in my book.

4 Q. Are you saying that we could use
5 fossil options for meeting future electricity demand
6 tomorrow?

7 A. We use it today and we will use it
8 tomorrow, yes. They will not be new fossil options;
9 they will be existing fossil options.

10 Q. Now your statement says "as well as
11 fossil options that could be, could be used". To me
12 that implies new. Were you not talking about new
13 fossil options?

14 A. The panel described what we will do
15 with existing fossil facilities as well as options that
16 could be built and built in several years from now to
17 meet demand into the longer period, so --

18 Q. Let's just talk about future.

19 A. Yes.

20 Q. Fossil options that could be used in
21 meeting future electricity demand. When does that
22 start?

23 A. You can build new facilities
24 depending on their complexity and siting anywhere from
25 four years from now to eight years from now depending

1 on where and when the need is recognized and where you
2 are going to site them and so on.

3 Q. But you are not asking for any fossil
4 approvals for five years.

5 A. No, we are not.

6 Q. And that appears in the Update in the
7 approvals that you are seeking, page 33 of the Update,
8 Exhibit 452.

9 A. That's correct, yes.

10 Q. So as far as fossil options that
11 could be used for meeting future electricity demand, we
12 are talking about the demand after five years, aren't
13 we?

14 A. No, I think we referred in our
15 testimony and in response to other questions to this
16 notion of response portfolio which is shown in Exhibit
17 452 as well. If it turns out that we need additional
18 resources, we will take steps to secure the
19 environmental approvals to put additional facilities,
20 as required.

21 Q. So do you have any construction plans
22 right now?

23 A. No.

24 Q. And you are not seeking any approvals
25 for any construction plans right now from this panel?

1 A. Not for fossil.

2 Q. Not for fossil. What are you
3 seeking?

4 MR. HOWARD: Well, Mr. Chairman, I think
5 this has been the subject of some discussion, whether
6 or not it is an appropriate discussion for this panel.
7 On January - what was the date? - when we introduced
8 the update and spoke to it and we are going to deal
9 with it again on March 9th. But what we are asking for
10 is in the environmental application as updated.

11 MR. GREENSPOON: I don't need to know the
12 answer to the question.

13 THE CHAIRMAN: I think the answer is in
14 452, what they are asking for right now.

15 MR. GREENSPOON: I think it is too. I
16 just don't know how to find it.

17 MR. SHALABY: I think Exhibit 452 states
18 the facilities that Hydro is requesting approval for,
19 being the Manitoba transmission and hydraulic program.

20 MR. GREENSPOON: Q. Yes. All right.
21 What about the life management and life extensions?
22 Are you seeking approvals for those from this panel?

23 MR. SHALABY: A. No.

24 Q. Are you seeking comment from this
25 panel on life management and life extension?

1 A. Not explicitly. I don't think it was
2 one of the 452 items that we specifically itemized, but
3 of course the panel will comment on and it is free to
4 comment on whatever the aspects of the case they wish
5 to.

6 Q. The panel may comment.

7 A. They may, yes.

8 Q. You didn't mean to say they will
9 comment?

10 A. I say they will comment on whatever
11 they wish to comment on. I presume that is safe to
12 say.

13 Q. When we talk about life extensions
14 and life management, there will be some construction
15 involved in these?

16 A. Yes.

17 Q. Because there will be emissions,
18 there will be environmental concerns and I guess some
19 general management concerns about how the plant runs
20 both from an environmental point of view and from an
21 efficiency point of view?

22 A. That is correct.

23 Q. Now will you require environmental
24 assessment approval for those construction projects?

25 MR. HOWARD: Now we really have a legal

1 question, Mr. Chairman. I think as we explained at the
2 time we consider that alternatives to the undertakings
3 being specifically proposed are required to be examined
4 under the statute. And I don't think that this panel
5 should be asked to come to a legal conclusion as to
6 whether or not and in what circumstances environmental
7 approvals under the Act are required for facilities
8 that are being constructed.

9 I can assure the Board that the legal
10 staff at Hydro and their counsel will make the
11 appropriate applications when the times comes.

12 MR. GREENSPOON: Well, perhaps I could
13 rephrase the question, Mr. Chairman.

14 THE CHAIRMAN: All right. But I think
15 you understand Mr. Howard's point that Mr. Shalaby may
16 have views about what they are seeking approvals. But
17 whether or not they are required to get approvals for
18 the life extension or life management program is a
19 legal question.

20 MR. GREENSPOON: Q. Mr. Shalaby, briefly
21 could you outline the types of changes that I was
22 asking you about that would be required for these life
23 extensions. Just briefly, what are we talking about.

24 MR. SHALABY: A. As Mr. Meehan and Mr.
25 Burpee explained, life extension and life management

1 involve monitoring of the status of the equipment,
2 replacement of some of the equipment, as well as
3 addition of environmental controls. In broad
4 categories those are the kinds of activities.

5 Q. What kind of environmental controls
6 are we looking at? Electrostatic precipitators,
7 scrubbers, baghouse filters?

8 A. Flue gas desulphurization which is
9 scrubbers, electrostatic precipitator enhancements or
10 improvements, selective catalytic reduction, which is
11 NOx control or their equivalent, the CPMs, the
12 combustion process modifications.

13 Q. Now has Ontario ever done any of
14 these things before?

15 A. They have done combustion process
16 modifications. They have done electrostatic
17 precipitator enhancements. We are building a pair of
18 scrubbers right now.

19 Q. Did you seek environmental assessment
20 approval for those enhancements, those scrubbers,
21 electrostatic precipitators and CPMs?

22 A. We sought environmental approvals for
23 the scrubbers and we have received environmental
24 assessment approval for a program of scrubbers on our
25 stations.

1 Q. So do you already have environmental
2 assessment approval to put scrubbers anywhere you want?

3 A. On Lakeview, Nanticoke and Lambton,
4 we do, yes. With conditions, there are conditions on
5 the approval, but yes, we do.

6 Q. And those would be reflected in the
7 exhibit where we see the sulphur dioxide emissions
8 going down over the next 20 years; that is, the
9 installation of scrubbers at Lakeview and Nanticoke are
10 how we are going to see less sulphur dioxide emitted;
11 is that correct?

12 A. Not necessarily at those stations.
13 It's a separate issue. We have various ways of
14 controlling emissions but we do have environmental
15 approvals to install scrubbers if we feels that is the
16 appropriate measure to install.

17 Q. Dr. Effer, on page 18866, Mr. Howard,
18 firstly on 18865 across the page, Mr. Howard was asking
19 you whether you feel you can meet environmental issues
20 just by conforming to existing regulations, and you
21 said not entirely.

22 And at the end of that question, you
23 said, and this is over on page 18866:

24 Finally, where no regulations exist,
25 we attempt to keep environmental effects

1 as low as reasonably achievable.

2 Now that "as low as reasonably
3 achievable" is sometimes known as the ALARA principle?
4 [10:35 a.m.]

5 DR. EFFER: A. That is correct.

6 Q. Are you saying that it is the policy
7 of Ontario Hydro where there are no regulations to
8 follow the ALARA principle?

9 A. There is a definition of as low as
10 reasonably achievable which we tend to subscribe to.

11 Q. Now, there is another concept that's
12 called the BATEA, Best Achievable Technology
13 Environmentally Acceptable?

14 A. Yes.

15 Q. Does Hydro not subscribe to that?

16 A. Yes.

17 THE CHAIRMAN: Yes, it doesn't or yes it
18 does?

19 DR. EFFER: Yes, it does subscribe.

20 MR. GREENSPOON: Q. When does Hydro
21 choose the best available technology over the as low as
22 reasonably achievable?

23 DR. EFFER: A. The best available
24 technology is applied under those conditions where we
25 are on the point of meeting regulations or criteria or

1 guidelines, and we will install the equipment to
2 conform to emissions or whatever the regulations apply
3 to meet that regulation.

4 Q. So you use the best available
5 technology when you are in a pinch, when you really
6 have to cut down your emissions; is that what you are
7 saying?

8 A. Economically achievable is another
9 factor in that definition, and some technologies are
10 either not developed thoroughly for that particular
11 situation or impose a high economic cost.

12 Q. But basically you aim at the
13 regulations; isn't that correct?

14 A. Yes.

15 Q. There is some technology out there
16 and if it's too expensive but it will do better for the
17 environment, you don't necessarily go for that best
18 technology?

19 A. We decide on what is the economically
20 attractive alternative and which will conform to the
21 regulations.

22 Q. The regulations, okay.

23 Now, Regulation 308 and Regulation 309, I
24 think that one of your staff has copied these handouts
25 for you.

1 Perhaps these three pages could be made a
2 composite exhibit, Mr. Chairman.

3 THE CHAIRMAN: What are they?

4 MR. GREENSPOON: It's an excerpt from
5 regulation -- actually, it could be named Excerpts from
6 the Environmental Protection Act, revised Statutes of
7 Ontario.

8 THE CHAIRMAN: Give that an exhibit
9 number, please?

10 THE REGISTRAR: 482.

11 ---EXHIBIT NO. 482: Excerpts from The Environmental
12 Protection Act, revised Statutes of
Ontario.

13 MR. GREENSPOON: Thank you, Mr. Chairman.

14 Q. Dr. Effer, just to give us an
15 overview, Regulation 308 is air quality and Regulation
16 309 is hazardous waste?

17 DR. EFFER: A. That's in a general
18 sense.

19 Q. In a general sense.

20 And there are other regulations that
21 Ontario Hydro is subject to, but those are the two that
22 you certainly referred to the most in your evidence,
23 308 and 309?

24 A. That's correct.

25 Q. If you just look at Section 5 of the

1 Environmental Protection Act, it says that no person
2 shall discharge into the natural environment any
3 contaminant and no person responsible for a source of
4 contaminants shall permit the discharge into the
5 natural environmental of any contaminant from the
6 source of contaminate in an amount, concentration or
7 level in excess of that prescribed by the regulations.

8 Then if you look at Regulation 308,
9 Section 6, no person shall cause or permit to be caused
10 the emission of any air contaminant to such an extent
11 or degree as may cause discomfort to persons, cause
12 loss of enjoyment of normal use of property, interfere
13 with normal conduct of business, or cause damage to
14 property.

15 Those are statutes that Ontario Hydro is
16 subject to? These are the Statutes of Ontario?

17 A. Yes.

18 Q. And that regulation?

19 A. Yes.

20 Q. Now, how is it that Ontario Hydro is
21 able to be exempted from those statutes?

22 A. I don't understand your question, Mr.
23 Greenspoon.

24 Q. Perhaps I am jumping ahead of myself.

25 You gave evidence that Ontario Hydro

1 emits acid rain.

2 A. Acid gases.

3 Q. Acid gas, which is commonly known, as
4 you said in your evidence, as acid rain?

5 A. Yes.

6 Q. And it's admitted by Ontario Hydro
7 that acid rain causes damage to property.

8 A. That is correct.

9 Q. And does Ontario Hydro not admit that
10 their emissions cause damage to property in Ontario?

11 A. Ontario Hydro contributes to the
12 deposition of acid rain.

13 Q. Yes. And Ontario Hydro causes damage
14 to property in Ontario.

15 A. Yes.

16 Q. Why isn't Ontario Hydro prosecuted
17 under this statute?

18 A. Because we are conforming to the
19 regulations that are laid down specifically on Ontario
20 Hydro to limit the amount of acid gases that we
21 produce.

22 Q. And that's called a control order?

23 A. No, that's a regulation.

24 Q. A regulation. And that regulation
25 exempts you from this regulation?

1 THE CHAIRMAN: I believe that is a legal
2 question, Mr. Greenspoon.

3 MR. GREENSPOON: Q. Is Ontario Hydro
4 subject to any control orders?

5 DR. EFFER: A. Yes, we are.

6 Q. What are those control orders?

7 A. I can't speak in detail, but we have
8 had, we have and may we have control orders
9 specifically to air emissions from some of our plants.
10 Maybe Mr. Burpee can help a little more in detail about
11 Lakeview, for example.

12 No? It's all right.

13 We have been under ministerial orders to
14 control emissions under specific meteorological
15 conditions, for example, that is one example of a
16 ministerial control order.

17 Q. Can I be provided with copies of the
18 control orders with relation to fossil plants in
19 Ontario?

20 A. These control orders are specific to
21 individual plants and are specific to a set set of
22 circumstances.

23 Q. Perhaps if I could have a list of
24 them, of the control orders that are in existence?

25 A. That we are now subject to?

1 Q. That you are now subject to?

2 A. Yes.

3 Q. Thank you.

4 If that could be given a number, Mr.
5 Chairman.

6 THE REGISTRAR: 478.14.

7 MS. PATTERSON: So is that list just
8 control orders or ministerial orders and special
9 regulations.

10 MR. GREENSPOON: I don't know the
11 regulations, Ms. Patterson.

12 THE CHAIRMAN: There may be specific
13 regulations that are specific to Ontario Hydro.

14 MR. GREENSPOON: Yes, there are.

15 THE CHAIRMAN: That's what you are
16 referring to.

17 MR. GREENSPOON: Perhaps that could be a
18 list as well under the same undertaking, list of
19 regulations that are specific to Ontario Hydro under
20 the Environmental Protection Act.

21 DR. EFFER: Yes.

22 MR. GREENSPOON: Thank you.

23 ---UNDERTAKING NO. 478.14: Ontario Hydro undertakes to
24 provide control orders and list of
25 regulations specific to Ontario Hydro
under the Environmental Protection Act.

1 MR. GREENSPOON: Q. I wanted to talk a
2 minute about acid rain. It wasn't very long ago that
3 there were people, the most famous of whom was the
4 former president of the United States, who said that
5 acid rain needs more study. Then there were a lot of
6 people who supported that. Scientists who said we are
7 not convinced that there is scientific evidence that
8 acid rain is causing damage and we need more study; is
9 that not correct? There was a school of thought who
10 believed that?

11 DR. EFFER: A. There was a school of
12 thought, yes.

13 Q. And you, Dr. Effer, now know and
14 probably I would assume you knew then that that school
15 of thought wasn't correct?

16 A. Correct.

17 Q. In fact, acid gas emissions and acid
18 rain, it's incontrovertible that it causes damage?

19 A. Yes, I think it is.

20 Q. And the big impact for my client in
21 Northern Ontario is on the forest and on the lakes?

22 A. Yes.

23 Q. You gave evidence that would indicate
24 that the growth over the last number of years in the
25 forest has been restricted, the trees aren't growing as

1 fast now as they used to and people believe that is
2 because of acid rain?

3 A. I think I said in my direct evidence
4 that that is one of the effects of acid rain. I don't
5 believe I related it specifically to one area or tried
6 to quantify it in any way.

7 Q. All right. Have you seen a study of
8 the Great Lakes forest region that shows the growth
9 rings for the last 30 years are substantially smaller
10 than their growth rings for the previously 30 years?

11 A. I have not read the study but I know
12 of it.

13 Q. You know of it. That came out in the
14 late 70s, early 80s?

15 A. That report I can't identify.

16 Q. But you are aware of that report, the
17 Great Lakes forest and the growth rings?

18 A. Yes.

19 Q. Now, I just wanted to ask you briefly
20 about your understanding of the mechanism of how -- no,
21 I won't ask the question. I was going to ask about the
22 mechanism of this impact on the forest, but it's
23 obviously not relevant. I am just curious.

24 I wanted to ask you, Dr. Effer, the
25 amount of SO(2) per tonne of coal, have you got that

1 figure?

2 A. It is in several exhibits, including
3 the thermal cost review, the environmental analysis.

4 Q. Do you know it off the top of your
5 head, or it's not one of those numbers?

6 MR. DAWSON: A. It depends on the
7 percentage of sulphur that's in the coal. It can vary
8 from .2 per cent with the western Canada coal, to 2-1/2
9 per cent to 3 per cent in some of the medium sulphur
10 U.S. coals.

11 Q. I think, just generally, what is the
12 amount of sulphur in a ton of American coal and what is
13 the amount of sulphur in a tonne of Canadian coal,
14 taking a median percentage?

15 A. It's .8 per cent typically in --
16 well, maybe Mr. Smith should be answering this, but
17 it's .8 per cent in the low sulphur U.S. coal, and
18 typically .2 to .5 per cent in Western Canadian and
19 Western U.S. coal.

20 Q. Does that mean that we would just
21 multiply 2,000 pounds by .8?

22 A. That's right.

23 Q. And that would give us the tonnage of
24 sulphur dioxide?

25 A. That's right.

1 MR. SMITH: A. I don't think that's
2 technically correct. I wouldn't like to tell you how
3 to do it, but I don't think that's quite right. You
4 have to take into account the oxygen as well.

5 MR. DAWSON: A. I'm sorry, I
6 misunderstood your question. I thought your question
7 related to sulphur.

8 Q. I thought I said sulphur dioxide.

9 A. Together, sulphur dioxide, you double
10 it.

11 Q. You double it?

12 A. Right. Because the atomic weight of
13 sulphur is 32 and the atomic weight of the oxygen, of
14 the two molecules, of the two atoms of oxygen which
15 attaches to the sulphur is also 32. So it doubles the
16 weight of the sulphur dioxide.

17 Q. Okay. So, what does that mean then?
18 We have got 8 per cent sulphur, did you say in American
19 coal?

20 MR. SMITH: A. .8.

21 Q. .8. So we have got 3. -- so, it
22 would be 1.6 per cent of a ton?

23 MR. DAWSON: A. That's right.

24 Q. Which is how many pounds?

25 A. One per cent is 20 points, so 1.6 per

1 cent is about 32 pounds.

2 Q. 32 pounds. Okay, that's what I
3 wanted to know.

4 What is the percentage in Canadian coal?

5 MR. SMITH: A. It depends on the coal.
6 Every coal is different. Some Canadian coal is .2 per
7 cent, some is .8 per cent, some is .4 per cent. If you
8 buy it in Nova Scotia some of it's over 3 per cent. So
9 it depends on where you buy it from and what the
10 characteristic of the coal is.

11 The coal that Ontario Hydro currently
12 purchases is approximately .25 per cent.

13 Q. In the West?

14 A. That's correct.

15 Q. So we would get about 10 pounds of
16 sulphur dioxide from that per tonne?

17 A. Per tonne, yes. But the tonne of
18 coal has something like 15 per cent less heat content,
19 so you burn more of it to get the same amount of
20 output, so in fact there is a further correction to
21 that.

22 Q. When you convert it to energy?

23 A. That's correct.

24 Q. Yes. I just wanted to have a figure.
25 We are looking at between ten and 32 pounds of sulphur

1 dioxide for every tonne of coal we burn in Ontario.

2 [10:54 a.m.]

3 A. I think if we have done the
4 calculations up here in our head correctly, that will
5 be right.

6 Q. Well, I think you would certainly
7 correct it if you had to but I think that's right.

8 Now I take it that these emissions, Dr.
9 Effer, that you are talking about on page 18872 of the
10 transcript, and I think you are referring to overhead
11 E4. Are we talking about metric tonnes here -- are we
12 talking about 2,200 pound tonnes?

13 DR. EFFER: A. We are talking about
14 metric tonnes.

15 Q. So that's 2,200 pounds?

16 MR. DAWSON: A. It's very close, yes.

17 Q. Very close, okay.

18 So then our figures of ten pounds to 32
19 pounds are a little bit low, aren't they, because I
20 think you multiplied 1.6 by 2,000 to get 32 and it
21 should have been by 2,200.

22 A. You quoted 2,000 pounds, not us, but
23 the emissions of SO(2) are regulated in metric tonnes
24 of megagrams, not in U.S. tons, that's correct.

25 Q. All right. So my calculation is 22

1 times 1.6 is about 35; is that fair, Mr. Dawson?

2 A. I'm sorry, I'm not following your
3 calculation.

4 Q. 1.6, because you said you had to add
5 the molecular weight of --

6 A. You double the molecular weight of
7 sulphur, that's right.

8 Q. So that's 32 times 1.6 -- I'm sorry,
9 32 --

10 A. I am not sure what your 1.6 is. But
11 to correct for metric tonnes, you would add about 10
12 per cent if you said it's about 2,200 pounds as opposed
13 to 2,000 pounds in an American short ton.

14 DR. CONNELL: If we are going to work in
15 metric tonnes, why not work in kilograms too.

16 MR. GREENSPOON: I think that's a good
17 idea, Doctor. Maybe what I could --

18 MR. SHALABY: Can I be helpful for a
19 change in --

20 MR. GREENSPOON: Q. Right. I thought I
21 was good in math.

22 MR. SHALABY: A. If we expressed the
23 emissions in grams per kilowatthour of electricity,
24 would that be more helpful to you than tonnes of coal.

25 Q. I didn't really want that. I wanted

1 grams per tonne of coal or kilograms as Dr. Connell
2 suggested. Perhaps I could --

3 A. The information of all the emissions
4 in grams per kilowatthour of electricity produced takes
5 into account the efficiency of conversion, takes into
6 account a whole lot of other things. All of that is in
7 the thermal cost review and that elsewhere.

8 Q. Perhaps if somebody could just do the
9 math and give me an estimate of western coal and
10 American coal, a median value of sulphur content, and
11 how many kilograms of sulphur dioxide are produced on
12 the burning of each metric tonne of coal.

13 A. That's where the efficiency of the
14 burning comes in, you see.

15 Q. But if you burn a tonne of coal, you
16 are going to get the same amount of sulphur dioxide
17 from it regardless of how many megawatts you get out of
18 it; isn't that right, Mr. Shalaby?

19 A. Yes.

20 Q. So that's what I want to know.

21 MR. DAWSON: A. Well, .8 per cent of
22 sulphur coal would give you 16 kilograms of SO₂ per
23 metric tonne. So 0.25 per cent sulphur would give you
24 5 kilograms per metric tonne.

25 Q. Thank you very much.

1 Now, Dr. Effer, getting back to that
2 reference in the transcript, to E4. I'm sorry, I will
3 give you a moment.

4 DR. EFFER: A. Are you going to be
5 referring to E4 Mr. Greenspoon.

6 Q. Just briefly.

7 A. Okay.

8 MR. HOWARD: Exhibit 470.

9 DR. EFFER: I have E4 now.

10 MR. GREENSPOON: Q. All I wanted to know
11 was the amount of sulphur dioxide that that graph shows
12 that we are getting today, would that be calculated by
13 drawing a line from 1992? It looks like it would hit
14 that asterisk on the 280,000 line.

15 DR. EFFER: A. I'm sorry, I don't
16 understand.

17 Q. The acid gas emissions in 1992 are
18 280,000?

19 A. That is the regulatory of the limit
20 of the acid gas plus nitric oxide.

21 Q. Okay. This is one of those
22 regulations that we were talking about in your
23 undertaking then, Regulation 281 of '87?

24 A. Correct.

25 Q. Is this the only regulation with

1 respect to sulphur dioxide?

2 A. No, we have to conform to air quality
3 regulations pertaining to sulphur dioxide. This is a
4 localized regulation which lists the various
5 concentrations of contaminants and we have to, by
6 regulation, conform to an air quality guideline.

7 Q. Now Regulation 308 isn't the one you
8 are talking about though?

9 A. The air quality guidelines that we
10 operate by are under that regulation.

11 Q. Under Regulation 308?

12 A. Yes.

13 Q. Now, under any of these sulphur
14 dioxide regulations, is there a schedule of a rate that
15 Ontario has to pay per tonne of sulphur dioxide that it
16 emits?

17 A. No.

18 Q. So Ontario Hydro doesn't pay anything
19 for emitting sulphur dioxide?

20 A. No.

21 Q. And if you reduce the amount of
22 sulphur dioxide you don't save any money because there
23 is no rate, at least in that regard?

24 A. In the sense that saving money inside
25 a regulation, no.

1 Q. And there are no regulations that
2 prescribe a fee per tonne of sulphur dioxide?

3 A. No.

4 Q. I wanted to ask you about on page
5 18873, and if you could refer to page 7 of Exhibit 452.

6 A. Page?

7 Q. Seven. Now you say at line 5 -- you
8 were asked, sorry, I better go back to the question:
9 Is there anything in the regulation that relates these
10 discharges to future increases in electricity demand?

11 And your answer was: You don't believe
12 there is anything specific but you agree that the 94
13 limit is to be maintained, irrespective of future
14 increases?

15 A. That's correct.

16 Q. Now what about if we look at -- we
17 have heard that Ontario Hydro is forecasting to the
18 median. We heard earlier that Ontario Hydro forecast
19 to the high -- or they don't call it the high, they
20 call it the upper. And I guess my question is: If we
21 forecast to the low, which Ontario Hydro doesn't do
22 yet, not to suggest that they might, but if we forecast
23 it to the low, it would appear by the graph on page 7
24 that demand is going to go down and probably the lowest
25 point is around 2005 or 2006 in the lower forecast.

1 A. That's what that diagram says, yes.

2 Q. Now would it be fair to say that if
3 demand goes down like that, that we can look at
4 prorated decreases in the 1994 limit and the 2005
5 limit?

6 A. I can't speak for what the regulatory
7 agencies will do.

8 Q. Well, I am not asking what the
9 regulatory agencies would do because I think we should
10 just assume the regulations will move along as they
11 currently are. I am asking you if Ontario Hydro sees a
12 drop in demand if it is going to cut down on its fossil
13 fuel production, its fossil fuel generation?

14 A. In a general sense if we stay below
15 the regulations, I don't believe there is any reason or
16 logic for reducing the regulations progressively. I
17 don't think the two are really connected.

18 Q. But your equipment, Dr. Effer, is
19 designed to take a certain amount of sulphur dioxide
20 out of every tonne of coal; and if you are burning less
21 coal and making less megawatts, surely it would be
22 easier for you to reach even better targets?

23 A. As the update says, we will be
24 reducing sulphur dioxide progressively due to the
25 planned installation of scrubbers.

1 Q. But you are forecasting to meet the
2 median load in this update. I am asking you if you
3 forecast, if you planned to meet the lower load, surely
4 you could do better with sulphur dioxide emissions, not
5 much better but you are going to need 3,000 or 4,000
6 less megawatts than even you have now.

7 A. The planning won't affect it, but the
8 actual performance will affect emissions. And yes, if
9 we do meet those lower growth rates, then we will
10 reduce emissions.

11 Q. Okay. Now, I wanted to move on to
12 global warming and CO(2) emissions, and I wanted to ask
13 you, Dr. Effer, if the phenomenon that you spoke of,
14 you talked about some people think that the global
15 temperature is going to go up 1 or 2 degrees and now
16 you said there is new scientific evidence that it is
17 going to go up only a half a degree.

18 A. I don't believe that is exactly what
19 I said, Mr. Greenspoon. I think I referred to
20 historical data which indicated that annual global mean
21 temperatures had risen by half a degree in the last 100
22 years - that is an established measurement - and the
23 division of opinion as to whether that is attributable
24 to greenhouse warming or not.

25 Q. So there is even some debate whether

1 the half a degree that we have gone up in the last....

2 How long?

3 A. Hundred years.

4 Q. Hundred years. Whether that is
5 attributable to global warming?

6 A. That is right.

7 Q. And on page 18883, you say at line 2,
8 temperature increases predicted between 1-1/2 and 4-1/2
9 degrees Celsius due to CO(2) doubling.

10 A. Yes I see that.

11 Q. Then you go on to say at the end of
12 that paragraph:

13 The more recent predictions of global
14 warming have tended to be in the lower
15 range, the lower end of this range of
16 temperature increases.

17 A. Yes.

18 Q. So there is debate in that area as
19 well.

20 A. Very much so, yes.

21 Q. And likewise there is debate about
22 the melting of the ice and what impact these
23 temperature changes will have?

24 A. Yes.

25 Q. There is debate about the whole

1 thing?

2 A. A great deal, yes.

3 Q. And would it be fair to say that if
4 you could call this a -- if you called the people that
5 thought it wasn't going to impact skeptics, would it be
6 fair to say that the phenomenon of skepticism about
7 this CO(2) issue is a lot like the same thing we saw
8 with acid rain?

9 A. I wouldn't care to make an analogy
10 between the two or to even assign the fact that people
11 are doubting the connection between temperature rise
12 and ice melting as being skeptics. For the most part,
13 the scientists are usually cautious people -- and if
14 you are using skepticism applied to that, I don't think
15 it is --

16 Q. No, I wasn't actually referring to
17 the scientists. I think it is often the politicians
18 that we hear about who are skeptical about the impacts
19 of CO(2). I just wondered if whether it was a fair
20 analogy?

21 A. I think one can take that analogy to
22 the point that there are people who will support a
23 certain course of happenings and people who doubt it;
24 in that sense there is the same pros and cons from the
25 greenhouse effect, but I wouldn't draw the analogy too

1 much tighter than that.

2 Q. Now, again, are there any regulations
3 regulating CO(2) emissions by Ontario Hydro?

4 A. No..

5 Q. So it would be fair to say that there
6 are no regulations that prescribe a fee for the
7 emission of CO(2) as well?

8 A. No regulation, no.

9 Q. If I could move onto toxics. When we
10 are talking about toxics, Dr. Effer, we seem to move
11 into Regulation 309.

12 A. Yes.

13 Q. Even though some of the toxics, I
14 think 80 per cent of the flyash goes up the stack?

15 A. Yes, that's true.

16 MR. DAWSON: A. I would just like to
17 make a correction. 80 per cent of the flyash does not
18 go up the stack; 80 per cent of the flyash is carried
19 through the boiler and collected in the precipitator
20 and better than 99 per cent of that flyash is collected
21 in the precipitator.

22 Q. I guess what I meant is without the
23 precipitator it is an air pollutant and it would have
24 struck me that as such it would have come under
25 Regulation 308 rather than Regulation 309. I suppose

1 there is nothing to be made of that.

2 A. There are regulations under 308 which
3 limit particulate emissions in the same way that they
4 control SO(2) emissions and nitrogen oxide emissions.

5 Q. But you basically deal with them
6 under Regulation 309 because you are precipitating
7 them. Is that the answer then to that question.

8 DR. EFFER: A. The air toxics, that is,
9 by definition those toxics that are released via the
10 stack are under Regulation 308. The air toxics which
11 are associated with the solid waste produced, that is
12 the flyash, are under 309.

13 Q. Okay. I understand.

14 So, Mr. Dawson then, or Dr. Effer, what
15 do we see coming out of the stacks in terms of toxics?

16 A. We have many interrogatories and
17 exhibits with comprehensive lists of these materials.
18 It is in the Thermal Cost Review in great detail and
19 also Exhibit 468 in the Environmental Health Effects.

20 Q. Is there a chart that you can readily
21 refer me to that indicates the emissions from the
22 fossil plants?

23 A. Are you referring to Ontario Hydro
24 fossil plants?

25 Q. Yes.

1 A. There is a chart in Exhibit 468 which
2 summarizes some of the emissions from Lakeview and
3 Lambton generating stations. And there is also some
4 work from Nanticoke.

5 Q. What I was particularly interested in
6 were the heavy metals or the metals. And I gathered,
7 Mr. Dawson, in your answer, when I said 80 per cent of
8 the flyash goes up the stack, your answer to that was
9 over 90 per cent of that 80 per cent is removed by
10 precipitators.

11 MR. DAWSON: A. That's right. 99 per
12 cent of that 80 per cent is removed by precipitators.

13 Q. All right. So we are seeing less
14 than 1 per cent of the flyash coming out the top of the
15 stack?

16 A. That's correct.

17 Q. Now what amounts of heavy metals --
18 you have something in front of you there, Dr. Effer?

19 DR. EFFER: A. We have a figure 3, 3.16.

20 Q. This is 468?

21 A. In 468, which gives the emission
22 factors, that's the grams per tonne of coal --

23 Q. Is this one of your overheads as
24 well? No?

25 MR. HOWARD: It is in Exhibit 468.

1 [11:15 a.m.]

2 DR. EFFER: I can't recall whether --
3 yes, there was an overhead.

4 MR. GREENSPOON: Q. I thought there was
5 an overhead.

6 DR. EFFER: A. Yes, there was an
7 overhead.

8 Q. Yes, E10. No, that's another figure.

9 A. Yes, we have overhead Ell.

10 Q. There is no reference to the exhibit
11 on it, but appears sandwiched between two -- it says
12 it's from Exhibit 4.

13 MR. DAWSON: A. DSP.

14 DR. EFFER: A. Yes, it is DSP option No.
15 1 and it is in Exhibit 4, yes.

16 Q. Now, these elements that we see, do
17 they come out of the stack as ions?

18 A. The majority of the elements are
19 associated or absorbed on to the surfaces of the flyash
20 which is emitted. Some of the elements are also
21 emitted in the vapour form, independently of the solid
22 material that's emitted.

23 Q. Now, what...

24 A. I'm not sure what -- are you implying
25 a charged particle?

1 Q. Yes, I was wondering about a charged
2 particle.

3 A. I don't believe there are charged
4 parcels there. Any charge that they might have is
5 neutralized when they would be absorbed onto the flyash
6 particle.

7 Q. Now, are these small particles or
8 large particles?

9 A. Extremely small. These are the ones
10 which are not being captured by the electrostatic
11 precipitator and generally in the order of one or two,
12 one or smaller micron diameter.

13 Q. Right. And just for my benefit, a
14 micron is?

15 A. A thousandth of a millimetre.

16 Q. And a pore is?

17 A. A pore?

18 Q. A pore in the human body is how many
19 microns, do you know?

20 A. It depends on how thick your skin is.
21 [Laughter]

22 Q. I thought that was a common frame of
23 reference for a micron, was that the human pore was so
24 many microns?

25 A. I have not heard that, I'm sorry.

1 Q. I have heard that and I don't
2 remember the number.

3 So, it's a thousandth of a millimetre,
4 and these particles you were saying, Mr. Dawson, to Dr.
5 Effer, they are that or smaller? One micron or
6 smaller?

7 MR. DAWSON: A. No, it's the sub micron
8 range of particles that are most difficult to collect
9 in an electrostatic precipitator, so they tend to
10 predominate in the emissions, yes.

11 Q. And we are looking at a half a gram
12 of arsenic in the sub micron level in every tonne of
13 coal that Ontario Hydro burns?

14 DR. EFFER: A. You are referring now to
15 table 3.16?

16 Q. Overhead Ell.

17 A. Which is essentially the same, yes.

18 Q. Okay.

19 A. Yes, using the parameters at the top
20 of the table, U.S. bituminous coal, that is the
21 emission.

22 Q. Half a gram per tonne?

23 A. Yes.

24 Q. How many tonnes of coal does Hydro
25 burn every year?

1 A. Just a minute. Yes, sorry, that's
2 grams per tonne, half a gram per tonne.

3 Q. How many tonnes of coal does Ontario
4 Hydro burn in a year? Mr. Smith, do you know that?

5 MR. SMITH: A. About 10 million.

6 Q. Ten million tonnes?

7 A. Yes.

8 Q. So how many grams of arsenic are
9 going out into the air every year?

10 Ten million times a half gram. So that's
11 five million grams.

12 MR. SHALABY: A. That table shows the
13 annual emissions, the table in Exhibit 463 shows 4.3
14 tonnes as annual emissions.

15 Q. Sorry?

16 A. Exhibit 468.

17 Q. I don't have that exhibit.

18 THE CHAIRMAN: Exhibit 468, table 3.16.

19 MR. SHALABY: It shows the annual
20 emissions from a four by 800 megawatt U.S. bituminous
21 coal station.

22 MR. GREENSPOON: Q. Yes. But if we look
23 at overhead Ell, there is a half a gram per tonne of
24 coal. If you are burning 10 million tonnes, then you
25 are going to get 5 million grams.

1 DR. EFFER: A. Correct.

2 Q. Five million grams of arsenic every
3 year. And that's sub micron, arsenic?

4 A. I know that some of that is absorbed
5 on the particles, but some of it is emitted in a vapour
6 form as well.

7 Q. But this is the emissions that we are
8 talking about?

9 A. Correct.

10 Q. This is what goes out at the top of
11 the stack.

12 A. Yes.

13 Q. And you can go down likewise with all
14 of the others. You multiply all of those others by 10
15 million and that will give you the annual output?

16 A. Yes.

17 Q. In grams.

18 Now, these heavy metals, they are all
19 heavy metals are they? Boron?

20 A. No, I wouldn't classify them all as
21 heavy metals. I would classify them as trace elements.
22 Some of them exist as gases, such as bromine, fluorine,
23 some of them are gases.

24 Q. But quite a few of them are heavy
25 metals?

1 A. Yes.

2 Q. Selenium, copper, nickel, cadmium,
3 arsenic?

4 A. Those examples are not totally
5 examples of heavy metals.

6 Q. In any event some of them are heavy
7 metals?

8 A. Correct.

9 Q. Just one last question about them.
10 The sub micron size of these particles, would that have
11 any impact on how they would be carried by the wind?

12 A. Essentially we regard for calculation
13 of the measurements that they would be carried along as
14 a gas, as a gas for purposes of calculation.

15 Q. But some of them don't come out as a
16 gas.

17 A. No. But they are so small that we
18 are not - at least I am not - aware of any diffusion or
19 transport mechanism which could distinguish their
20 pathway between the stack and the ground or their
21 receptor as being behaving fundamentally any different
22 than that of a natural gas.

23 Q. I see. So, the fact that they are so
24 small doesn't necessarily mean that they will just drop
25 right at the stack?

1 A. Not by any means, no.

2 Q. Okay. And are you certain about your
3 chemistry that none of the particles come out as
4 charged particles?

5 A. Not absolutely sure.

6 Q. Now, what about the benzo(a)pyrene
7 that comes out, what level are you talking about there?

8 A. I will refer you to table 3-17 in
9 Exhibit 468 and also overhead E12 in my direct.

10 Q. Again, you could multiply that by 10
11 million?

12 A. In the same way, yes.

13 Q. The same way.

14 I wondered if you could be so kind, Dr.
15 Effer, to give me the interrogatory number that you are
16 referring to, if there is one in particular, at the
17 bottom of page 18890, when you are talking about a --
18 18890.

19 Do you have that? I don't need it now,
20 if you could...

21 A. We have an interrogatory related to
22 stack emissions testing -- or monitoring, rather,
23 8.17.21.

24 Q. 8.17.21?

25 A. Yes.

1 Q. Does that provide the summary report
2 that you speak of? A summary report of these programs
3 have been provided in some detail in response to some
4 interrogatories, you say at line 22.

5 A. That one is primarily on stack
6 testing. It is not specifically related to the summary
7 reports. I would have to get back to you.

8 MR. GREENSPOON: Perhaps that could be
9 the next undertaking, Mr. Chairman.

10 THE REGISTRAR: 478.15.

11 THE CHAIRMAN: Well, I am not sure. That
12 would be part of the answer, so I think we don't
13 perhaps need to report that one. 8.17.21 is --

14 MR. GREENSPOON: That's true. That could
15 be deleted.

16 THE REGISTRAR: You don't need a number
17 for that, Interrogatory No.?

18 THE CHAIRMAN: No. Because it's not the
19 summary reports that's referred to on page 18890.

20 MR. GREENSPOON: That's right.

21 Q. On page 18892 --

22 DR. EFFER: A. Excuse me, Mr.
23 Greenspoon, I think I can refer to you the
24 interrogatory now. It's 8.17.13. The response to that
25 interrogatory provides tables, several tables on

1 emissions, some of which is Ontario Hydro data,
2 Lakeview stack testing. The emissions are measured by
3 Lakeview, and that may go some way to your answer.

4 MR. GREENSPOON: Thank you.

5 THE CHAIRMAN: That can be reported then.
6 That's 8.17.13 which should be the next interrogatory
7 number.

8 THE REGISTRAR: 475.16.

9 ---EXHIBIT NO. 475.16: Interrogatory No. 8.17.13.

10 MR. GREENSPOON: Thank you, Dr. Effer.

11 Q. On page 18892 you were talking about
12 Exhibit 468, which concludes that the effects of air
13 toxic emissions from a large coal burning station and
14 with the assumption that the scrubbers on this coal
15 station don't remove any toxics, these emissions will
16 fall within the acceptable risk criteria.

17 If I could just stop there. What do you
18 mean by acceptable risk criteria? What is that based
19 on? Is that based on an acceptable number of deaths or
20 diseases, cancers?

21 Because as well you say as set down by
22 regulatory agencies and then you give an example of one
23 such agency, and I wondered what criteria, which
24 regulatory agencies other than the environmental
25 protection agency you might have been referring to and

1 what those criteria are?

2 DR. EFFER: A. These are technical
3 determinations and are listed by the U.S. EPA and other
4 agencies, and they are arrived at by technical methods
5 of estimation, and we use these as our references, as
6 being the standards.

7 Q. Yes, but you call them acceptable
8 risk criteria. What is the risk?

9 A. That is a term used by these
10 agencies, that is a definition or a term which they
11 use.

12 Q. And what is your understanding of the
13 meaning of that term?

14 A. It means the level of risk which is
15 comparable to the types or the levels of risk that are
16 normally associated with the costs with living and
17 experiencing in our environment the numerous risks that
18 occur. This acceptable risk is one which falls within
19 the range of risks which normally we do experience in
20 our day-to-day lives.

21 Q. Would it be fair to say that the
22 acceptable risk criteria is based on a calculated
23 number of deaths or other incidence of health? And I
24 am sure my friend Mr. Campbell will deal with these
25 issues and I don't want to tread on his ground.

1 But isn't that what they mean when they
2 say acceptable risk, is so many people are going to die
3 or are going to contract diseases as a result of these
4 emissions but we accept that; isn't that what that
5 means?

6 A. That is the calculation which arrives

7 at that decision to describe it as an acceptable risk.

8 The calculation itself has numerous -- there are

9 numerous things which we have to take into account

10 which makes drawing specific deaths from that emission.

11 IJC as I said in Exhibit 468 specifically says that we

12 should be very careful not to deduce specific health

13 risks from these calculations.

14 Q. Well, I would hardly, with all

15 respect, I would hardly cite the IJC as a good example

16 of environmental protection.

17 Perhaps it's a good time to take the

18 break. It's 11:30, Mr. Chairman.

19 THE CHAIRMAN: All right, we will break

20 for 15 minutes.

21 THE REGISTRAR: This hearing will recess
22 for 15 minutes.

23 --Recess at 11:30 a.m.

24 ---On resuming at 11:47 a.m.

25 THE REGISTRAR: This hearing is again in

1 session. Please be seated.

2 THE CHAIRMAN: Mr. Greenspoon.

3 MR. GREENSPOON: Thank you, sir.

4 Q. Dr. Effer, the next area in terms of
5 emissions is what you call thermal discharges to water.
6 I wondered about the technical feasibility of
7 eliminating that thermal discharge to water by way of a
8 heat exchanger, and I wondered if you could comment on
9 the technical feasibility of that. There are products
10 available, technologies available to exchange all of
11 that heat, take all of that heat out of the water
12 before it is discharged; is that not correct?

13 DR. EFFER: A. There are cooling towers
14 which can transfer the heat to the air, either through
15 a water medium or through dry air cooling, yes.

16 Q. Or to other uses. If there was a use
17 for heat for that thermal discharge in the vicinity of
18 the fossil plant or the nuclear plant depending on what
19 was being cooled --

20 A. There have been what is called
21 beneficial uses of thermal discharges, yes.

22 Q. Is Ontario Hydro currently looking at
23 that option rather than discharging the water into the
24 Great Lakes?

25 A. We are not actively looking at

1 options for using -- there is one recent report that we
2 have got interested in the possibility of exchanging
3 the heat of the thermal discharge and using that low
4 grade heat for generating electricity at a cycle where
5 ammonia is used in the cycle. Maybe other members of
6 the panel can be more specific.

7 MR. DAWSON: A. I think you have got to
8 recognize that the actual discharge temperature is
9 relatively low in comparison to ambient lake
10 temperatures, so that it is very difficult to extract a
11 lot of useful heat out of it. There is some work going
12 on at Pickering, though, to look at using an ammonium
13 bottoming cycle to produce more generation from that
14 thermal discharge but it is experimental, as I
15 understand it, at the moment

16 Q. But your system to get the water out
17 into the lake is designed to get it out as cool as
18 possible, so presumably at the source of the boiler
19 where that waste heat is exchanged, there are btu's
20 available that could be used to produce energy instead
21 of putting it out into the lake.

22 A. The actual steam temperature at the
23 exhaust of the turbine is down below 50 degrees C. I
24 mean it's so cool you can put your hand on the side of
25 a turbine and it won't burn it, so that's the sort of

1 temperatures you are talking about at the back end of
2 the turbine.

3 You can extract steam up the turbine
4 cycle and use that for process heat, district heating,
5 whatever if you can find an economical use for it, and
6 we have certainly looked at that in the past.

7 Q. That heat could be used, for example,
8 in the same way in industry for cogeneration?

9 A. Exactly. That's exactly what it
10 would be. But you have got to recognize that most of
11 our units are extremely large and therefore there is
12 huge amounts of steam available, and most steam markets
13 are not in that size range. But at Bruce, for
14 instance, we are producing steam there that is being
15 used to supply industrial enterprises in the area.

16 Q. So that would be an advantage of
17 decentralized smaller supply, at least assuming not
18 dealing with any other reasons. If we had a smaller
19 decentralized supply, it would be feasible to set up
20 industries that could use that cogenerating capability
21 from the exhaust steam?

22 A. It is technically feasible, yes.
23 Whether it's economically feasible I don't know.

24 Q. The amount of water that is used in
25 one of these facilities, Dr. Effer, do you have any

1 idea about the amounts of water that are used? I see
2 Mr. Dawson is reaching for....

3 A. I think I do have some information
4 here in terms of discharges per kilowatthour generated.

5 Q. Would those apply to nuclear the same
6 way as fossil or are they specific to just fossil?

7 A. They would be limited to the fossil
8 options that we talked about in our direct evidence.

9 Yes, we are looking at, depending on the technology,
10 but for a conventional steam cycle, you are looking at
11 roughly 135 litres per kilowatthour generated. And for
12 combined cycle that reduces it. It is about a third of
13 that, it is 40 litres per kilowatthour generated.

14 Q. So to put that into perspective, how
15 many litres is that a year for...

16 A. I have no idea. If somebody can tell
17 me what the kilowatthours generated in a year is on the
18 Ontario Hydro system, we can calculate it. So it's 30
19 terawatthours times 135, that's 30 times 10 to the 12th
20 times 135.

21 Q. So what is 10 to the 12th.

22 MR. SHALABY: A. Three lakes full.

23 Q. Three lakes full; is that what you
24 said, Mr. Shalaby? [Laughter]

25 10 to the 9th is a trillion?

1 MR. DAWSON: A. It is roughly 4 times 10
2 to the 15th, I guess, litres.

3 Q. 4 times 10 to the 15th litres?

4 A. Yes.

5 Q. So it is trillions and trillions of
6 litres?

7 A. Yes. 4,000 trillion litres.

8 Q. 4,000 trillion litres a year.

9 Does Ontario Hydro pay anything for using
10 this water?

11 A. I believe we do -- no, for once
12 through cooling, no, we don't pay any water rental.

13 Q. And you do pay for water for your
14 hydraulic systems?

15 DR. EFFER: A. That's correct, yes.

16 Q. Now on page 18896, you refer to a
17 regular reporting mechanism, on line 19, about
18 temperature, suspended solids, fish killed, and you
19 report these regularly to the Ministry of the
20 Environment.

21 I wonder if those reports are available.
22 Do you have those reports?

23 A. These are quarterly reports and they
24 are submitted to the -- I believe they are done on a
25 quarterly basis. They are very extensive but they are

1 available as quarterly and possibly annual reports,
2 which might be a little more manageable.

3 Q. I wonder if I can have copies of the
4 last reports for the fossil stations.

5 A. These are operating division reports,
6 and we would have to acquire them from the operating
7 divisions, yes.

8 Q. If they are too lengthy, I wouldn't
9 want to go to the expense of copying them. If there
10 was an executive summary, that would be fine with me.

11 A. I am not certain that there is an
12 executive summary but there most probably is for the
13 annual report. Would you be happy with that?

14 Q. That would be fine. If that could be
15 the next undertaking.

16 THE CHAIRMAN: Next number.

17 THE REGISTRAR: 478.15.

18 ---EXHIBIT NO. 478.15: Ontario Hydro undertakes to
19 provide the executive summary from the
last annual report sent to the MOE re.
20 fossil stations.

21 MR. GREENSPOON: Q. Now you talked on
22 the next, page 18897, you talked about that you have a
23 cooling water system at Darlington where you have
24 submerged the intake and submerged the discharge.

25 DR. EFFER: A. That's correct.

1 Q. And this is different than Lakeview,
2 PICKERING and Lambton?

3 A. Yes, it is different from all our
4 stations using once through cooling.

5 Q. And Darlington is a once through
6 cooling?

7 A. Yes.

8 Q. So that is the major difference: is
9 the depth of discharge and intake?

10 A. The depth and the configuration --
11 it's not the depth, it's the configuration of the
12 intake and the discharge structures.

13 Q. And what do you mean by that?

14 A. The intake structure of previous
15 generating stations, such as Bruce "A", "B", Nanticoke
16 "A" and "B", have been underwater intakes which have
17 been buried under the lake. They come up with a
18 vertical riser and then there is a cap put on the top,
19 a large concrete lid or cap is put at a certain
20 distance above the actual intake. This translates the
21 downward flow to a horizontal flow which helps to
22 discourage intakes of fish.

23 In the case of the Darlington one, the
24 area of the intake is extremely large, about the size
25 of a small football field, and the configuration of the

1 concrete elements which are in that intake are such
2 that the approach velocity of the intake water is
3 sufficient to alert fish to that change of direction
4 and we are expecting a much reduced intake of fish.

5 Q. Now what kind of a depth is desirable
6 in the situation that you are talking about?

7 A. The Ministry is concerned about
8 staying away from areas which are so-called productive;
9 that is, are free from spawning beds, such things. And
10 we have fixed a depth which is essentially free from
11 the location of spawning areas. I am not quite sure
12 about the depth. I think it is about 40, 45 feet.

13 Q. 40 or 45 feet.

14 A. I may be guessing a little but it's
15 not far off that.

16 Q. Mr. Dawson, you are nodding your
17 head. Do you have knowledge?

18 MR. DAWSON: A. I think it is that order
19 of depth but I don't know precisely what the depth is
20 at the Darlington intake.

21 Q. Just as a generic example then I have
22 chosen a map of the North Channel. And up on the
23 left-hand corner of the map -- I just forgot the
24 exhibit number it was given but it is the map of the
25 North Channel.

1 THE REGISTRAR: 481.

2 MR. GREENSPOON: Exhibit 481.

3 Q. The left-hand corner of the map is
4 the mainland, somewhat east of Bruce Mines and
5 Thessalon and it is an area known as Dean Lake, and
6 Ontario Hydro of course is familiar with the area of
7 Dean Lake, having once thought they would like to put a
8 nuclear plant there.

9 Do you know that area, Dr. Effer?

10 DR. EFFER: A. Yes, Dean Lake was one of
11 six or seven potential sites, and the location was
12 examined in the 1970s for an energy centre which
13 initially included a nuclear station.

14 Q. If you look at the -- perhaps Mr.
15 Smith, you are standing right there. If you look at
16 the depth, you will see at the south end moving
17 southerly from - that's its - moving southerly from the
18 mainland there is a stripe of blue water and then there
19 is another stripe of lighter blue water. If you could
20 just read us the depth of the farthest, where the blue
21 water changes to the white water.

22 MR. SMITH: A. In here?

23 Q. If you see the Mississagi Island.
24 Yes, you see the Mississagi Island.

25 A. Right.

1 Q. What is the depth of water at the
2 extreme south.

3 A. In the white area?

4 Q. In the blue area.

5 A. In the blue area. I don't know what
6 the measure is.

7 Q. What's the number.

8 A. It has 22, 29, 29, 27, and I assume
9 that is feet. It could be metres or fathoms.

10 Q. If you look at the legend it's feet;
11 is that right? Depth in feet, I think if you see right
12 where it says Clapperton Island?

13 A. Yes.

14 Q. And under that it says.

15 A. Yes, "depths in feet".

16 Q. Depths in feet, okay. Thank you very
17 much.

18 So given your measurement of 40 feet
19 required for an intake or an output of a thermal
20 cooling, that's where we have to go is beyond that blue
21 line; is that fair to say, Dr. Effer?

22 DR. EFFER: A. If we had established
23 that was a productive area of fish then that would be
24 one criterion that would dictate that.

25 Q. Well, that area is known as the Blind

1 River Bank. Is that what that is called, Mr. Smith.

2 MR. SMITH: A. I am not sure where I am
3 looking.

4 Q. Do you see the name Blind River Bank?

5 A. Right here, yes.

6 Q. I think the name speaks for itself.

7 It isn't because of any money that is
8 deposited there, that's for sure.

9 Dr. Effer, I wanted to ask you about the
10 cooling water. Are there any contaminants in the
11 cooling water?

12 DR. EFFER: A. The intake and right
13 through to the discharge only contacts the metals of
14 the cooling water system and essentially there are no
15 contaminants in it.

16 Q. And that's for fossil plants.

17 Would the same be true of nuclear plants?

18 A. Between the intake and the discharge,
19 I would say the same -- well, I can't speak for nuclear
20 plants.

21 Q. Okay. Now, I was interested in the
22 chemical contaminants from a coal-fired plant. On page
23 18898, you list the process when you talk about water
24 treatment, draining from the yards, floors, sewage
25 treatment, fly and bottom ash ponds, coal-piled

1 drainage, and scrubbers discharges where there are
2 scrubbers. Where do these discharges go?

3 A. First of all, several of them go
4 through settling ponds and skimming structures, for
5 example, that take off oil. And the water remaining is
6 discharged into the cooling water or into a location
7 close to the cooling water discharge canal.

8 Q. So then there are pollutants
9 discharged into the water?

10 A. It's discharged into the area of the
11 cooling water canal --

12 Q. And there are pollutants in that
13 discharge?

14 A. Yes.

15 Q. And is that monitored, that
16 discharge?

17 A. We monitor some of those pollutants
18 and have done very extensively over the last year or so
19 under the Municipal Industrial Strategy for Abatement
20 program that we are now involved in, so we have a very
21 comprehensive listing of those pollutants in the
22 various discharges.

23 Q. These would be some of the more
24 serious emissions from a coal-fired plant?

25 A. They are the ones which are of

1 concern to the regulatory agencies, yes.

2 Q. And there is really no treatment
3 other than what you described?

4 A. Currently we, as I say, adopt those
5 treatments which I have described. The future ones
6 which we will be in all likelihood retrofitting on
7 existing plants will have much more comprehensive
8 treatments.

9 Q. This will be on the ground water
10 basically, you are saying?

11 A. I'm sorry?

12 Q. On the ground water around the
13 facility? I understand this range of pollutants is
14 from the sewage stream plant, the water that doesn't
15 have anything to do with the process?

16 A. With the main cooling water?

17 Q. With the main cooling water.

18 A. Yes, they are essentially different
19 sources, yes.

20 Q. Right. And you are discharging this.
21 water into the Great Lakes, except for one plant which
22 is not on the Great Lakes?

23 A. Correct, yes.

24 Q. And you mentioned the IJC. That's
25 the International Joint Commission?

1 A. That's correct.

2 Q. And that's a Canadian/American joint
3 body that looks at the Great Lakes?

4 A. Yes.

5 Q. And in their protocols, they are
6 moving towards establishing criteria of zero discharge?

7 [12:10 p.m.]

8 A. I am not certain that I know that
9 that's one of the stated objectives of the IJC.

10 Q. Have you recently read the protocols
11 or are you just speaking from memory?

12 A. I'm not sure the term zero discharge
13 is in there. It may be. I am not sure.

14 Q. Okay. In any event, certainly if we
15 go back to earlier this morning when we talked about
16 Hydro's three principles environmental control, zero
17 discharge is the thing that Hydro is aiming at always.
18 That's what it says.

19 A. Yes, we would aim towards that.

20 Q. So ideally you would not want to
21 discharge any pollutants from this paragraph of
22 pollutants that appears on page 18898?

23 A. Our aim is to materially reduce those
24 pollutants.

25 Q. But right now you are putting these

1 out when you operate fossil plants?

2 A. That is correct.

3 Q. Now, I think it was Dr. Connell --

4 and I have a note here on the side of the margin of my
5 transcript, beryllium and nickel, and I was
6 wondering -- I think he asked the question why some of
7 the elements appear on the one chart of emissions and
8 don't appear on the other chart for Regulation 309.

9 Did you come up with an answer to that?

10 A. The elements which are on the latter
11 overhead, which was the leachate analysis, include
12 those elements which are on the Ministry of the
13 Environment's list of toxic chemicals which have to be
14 monitored and controlled.

15 Q. Okay. But that's not to say that the
16 other elements that appear on the chart that we were
17 looking at earlier this morning are also toxic. In
18 fact, those are toxic elements; aren't they?

19 A. You are referring to air emissions or
20 water emissions now, Mr. Greenspoon?

21 Q. Well, I understood that we are
22 talking about the flyash and a leachate test and the
23 emissions that appeared in chart -- I understood that
24 the emissions that appear in chart E11 are the air
25 emissions that represent the small amount that isn't

1 taken out at the precipitators.

2 A. Yes.

3 Q. So presumably in the flyash all of
4 these things that come out the chimney are in the
5 flyash, the same elements in different amounts?

6 A. Yes.

7 Q. They don't appear in schedule 8, or
8 in schedule 4 of Regulation 309, E8. Antimony doesn't
9 appear, beryllium doesn't appear, bromine, cobalt,
10 copper, iron, manganese, nickel, selenium -- I'm sorry,
11 selenium and silver do appear -- thorium, titanium,
12 vanadium and zinc, none of those appear on Regulation
13 309, schedule 4?

14 A. Correct.

15 Q. And those are in the leachate of the
16 flyash?

17 A. I think if you look hard enough you
18 would find virtually every element in the leachate of
19 the flyash, yes.

20 Q. Well, to be fair now, 13 grams of
21 bromine goes out the stack at the top, doesn't get
22 trapped by the precipitators, 13 grams for every tonne,
23 and that's only 1 per cent of the 80 per cent of the
24 flyash that would normally go up the stack. So I put
25 it to you that there would be a lot of bromine in the

1 flyash?

2 MR. DAWSON: A. That depends on the
3 chemical form of the bromines in the flyash and how
4 much of it is soluble.

5 Q. Yes, but I think that Dr. Effer's
6 answer when he said if you looked hard enough implied
7 that there would be some pretty small amounts of these
8 other chemicals.

9 A. That's right. It may be down below
10 detectable limits, I don't know.

11 Q. But it also may not be.

12 A. It may not be.

13 Q. The Ministry for whatever reason has
14 chosen not include those elements in the regulation,
15 and you are not saying that's because those elements
16 appear in this flyash in small amounts, are you?

17 DR. EFFER: A. We are saying that the
18 listing under schedule 4 is the one which forms the
19 basis for us classifying solid wastes as registerable,
20 non-registerable or toxic. Those are the elements
21 which we have to provide chemical analyses for. And to
22 my knowledge that is the list, comprehensive list on
23 which the ministry bases its decision.

24 Q. So the chemicals that are not found
25 in that list you don't monitor in the flyash; is that

1 what you are saying?

2 A. With the chemical analysis which is
3 done on the leachate, I think it is such that it would
4 also measure many other elements by the nature of the
5 method of analysis, but it's not reported. I believe
6 that to be true.

7 Q. You are guessing, you don't know
8 that?

9 DR. CONNELL: I think that was the
10 essentially the answer you gave to the question I asked
11 and I think that's part of an undertaking; is it not?

12 MR. GREENSPOON: I think you have hit the
13 nail on the head. I think I recall now that you were
14 going to provide Dr. Connell with those figures.

15 DR. CONNELL: That's right.

16 MR. GREENSPOON: Thank you.

17 Q. Now, you say, the left-hand column of
18 schedule 4, Regulation 309, which is E8, that the
19 left-hand column of milligrams per litre is a drinking
20 water standard.

21 DR. EFFER: A. That is right, yes.

22 Q. So if you have a chemical which is
23 not registerable, that means that if you took that
24 leachate, the non-registerable leachate and added 9
25 parts of water to it you could drink it?

1 A. It's not the chemical which is
2 non-registerable, Mr. Greenspoon, it's the material
3 from which the leachate is derived. So, yes --

4 Q. Right. Okay.

5 So the leachate is drinkable if you
6 dilute it by a factor of 10?

7 A. The protocol by which the Ministry
8 derives the classification for the ash prescribes a
9 certain amount of ash and a certain amount of water to
10 be used in the leach tests. So this is the resulting
11 solution which is analyzed.

12 Q. And whatever that solution is, if you
13 diluted it by a factor of 10, the Government of Ontario
14 would say it's okay to drink it, because then it
15 wouldn't --

16 A. By our definition, yes.

17 Q. Because it would meet the left-hand
18 column?

19 A. Yes.

20 Q. You wouldn't drink it, would you?

21 A. I don't see why not.

22 Q. You have more faith in the government
23 than I do, at least in the regulation.

24 On page 18905 you refer to a concept of
25 lake filling. I wonder if you could tell me what that

1 means, and again we are still talking about the flyash.

2 A. This is lines 1 and 2?

3 Q. Yes.

4 A. By schedule 4, strictly the ash that
5 we produce from our coal falls within the
6 non-registerable classification, and if we were to take
7 that one criterion, it would be capable of being
8 landfilled.

9 However, there is another measurement
10 which is what is called the bulk analysis and that
11 simply measures the levels of elements in the ash
12 itself, and that is also used as a criterion for
13 deciding on whether the material can be actually used
14 for landfilling or not.

15 Q. I think you have answered my
16 question. It's not lake filling then; it's
17 landfilling?

18 A. Did I say landfilling? Sorry, I
19 meant lake filling.

20 Q. Oh, it is lake filling.

21 A. Yes, it is lake filling.

22 Q. So what does lake filling mean? You
23 . . put it in the lake? I guess that is what it means.

24 A. Yes.

25 Q. What lake do you do that to?

1 A. We don't do it.

2 Q. Oh, you don't do it. Oh, good.

3 So it cannot be used. I read your
4 answer: "However, it cannot at the moment be
5 entirely -- it cannot be used for a wide variety of
6 things, including lake filling."

7 Is any of it used for lake filling?

8 A. No.

9 Q. So then the "entirely" is not the
10 adverb.

11 A. Well, as I say, because it falls
12 short of some of the other Ministry of Environment's
13 requirements.

14 Q. Okay. What is the amount of flyash
15 that's produced? Have we got that figure, per tonne of
16 coal again?

17 MR. DAWSON: A. It varies again with the
18 coal, but it's in the region of 8, 9 per cent of the
19 coal so --

20 Q. It's 8 or 9 per cent?

21 A. Yes.

22 Q. So, it's a factor of 10?

23 A. So 10 million tonnes, it's roughly
24 one million tonnes, under one million tonnes.

25 Q. So you produce a million tonnes of .

1 flyash a year?

2 A. Something around that number, yes.

3 Q. What happens to most of this flyash,

4 Dr. Effer?

5 DR. EFFER: A. The majority of it is
6 disposed of on site.

7 Q. So it's left in a big pile on site?

8 A. Correct.

9 Q. That's not of really disposed --

10 A. It's not a big pile. It's
11 distributed over an area which is managed as a disposal
12 area.

13 Q. And this oil flyash, now this is
14 something different?

15 A. Yes.

16 Q. What are we talking about in terms of
17 amounts of oil flyash?

18 A. Very, very smaller than flyash. I am
19 not sure that we have access to the numbers here.
20 Very, very small amounts.

21 Q. It's a toxic under Regulation 309?

22 A. Yes.

23 Q. So somebody has the figures of how
24 much you produce because you have to --

25 A. Oh, yes, I am not denying there are

1 figures.

2 Q. Could I get those, please?

3 A. Yes.

4 Q. And these go to a landfill site,
5 these oil flyashes?

6 A. They currently are given to a
7 contractor that puts them in a registered landfill
8 site, yes.

9 Q. Who is that that they go to?

10 A. I don't know the name of the
11 contractor.

12 Q. Do you know which landfill they go
13 to?

14 A. I think it is -- what is the new name
15 for Tricil?

16 It is the company I believe which was
17 originally called Tricil. It's got a new name now.

18 Q. So you don't know where specifically
19 in Ontario this is disposed of?

20 A. I don't, no.

21 Q. Okay.

22 THE CHAIRMAN: Could we have an
23 undertaking number for the content of flyash from oil?

24 THE REGISTRAR: .16.

25 THE CHAIRMAN: 478.16.

---UNDERTAKING NO. 478.16: Ontario Hydro undertakes to provide how much oil flyash is produced.

MR. GREENSPOON: Q. Now what is going to happen, I don't want to cover ground that I think my friend Mr. Rogers covered, but I think he raised the issue of the landfill, the future of landfills in Ontario. Would you not agree, Dr. Effer, that the future of landfills in Ontario is looking pretty grim?

DR. EFFER: A. Yes, that is our perception.

Q. And particularly landfilling of
toxics like oil flyash?

A. I don't know how the registered landfill site volume is -- whether that will be developed and managed.

Q. Well, let me put it to you this way:
If it's becoming clear that municipal landfills for
non-hazardous domestic and commercial waste are not
being approved by the government, wouldn't it be fair
to say that the likelihood of toxic landfills to be
approved by the government is even less?

A. I don't see that that follows, no.

Q. Would you comment then on the proposition that it isn't appropriate to landfill toxic material at all environmentally?

1 A. On a well-managed landfill which is
2 being shown not to leach out by definition of a
3 registerable site--

4 Q. Well --

5 THE CHAIRMAN: Let him finish.

6 MR. GREENSPOON: I'm sorry.

7 DR. EFFER: --then I think it is
8 appropriate.

9 MR. GREENSPOON: Q. Well, I put it to
10 you that there is no such thing as a well-managed
11 landfill.

12 DR. EFFER: A. I don't know about that.

13 THE CHAIRMAN: That question is
14 definitely argumentative.

15 MR. GREENSPOON: I have been too long in
16 the criminal courts.

17 Q. You agree that there is leaching from
18 landfill?

19 DR. EFFER: A. From some landfill sites
20 there has been leaching.

21 Q. Okay. You were going to provide me
22 with the name of the site where this goes; are you?

23 A. Yes, I can do that.

24 Q. Maybe we can follow it up after that.
25 Now, you say later on page 18905 or, at

1 least Mr. Howard says: "What are the uses of flyash?"

2 Would it be fair to say that really -- we
3 are not talking about the uses of flyash; we are
4 talking about how do you dispose of it?

5 A. No, that is not correct.

6 Q. That's not correct?

7 Do you make money on the flyash? Is it a
8 profitable operation for Ontario Hydro?

9 MR. DAWSON: A. No, I don't think it is.

10 Most of it is disposed of.

11 Q. Do you have any idea why anybody
12 would use flyash as a soil modifier in agriculture?

13 DR. EFFER: A. I believe it's used in an
14 experimental basis for that, and I think in some
15 situations where the soil is of such a quality that it
16 is not able to support vegetation and that vegetation
17 isn't going to get into the food chain, I think it can
18 be an appropriate experimental use for that flyash.

19 Q. But again, to be fair, it's not fair
20 to call it an experimental use, because what it is is a
21 way of disposing of it for Ontario Hydro.

22 A. I think if we showed that soil of a
23 certain nature could be improved from whatever point of
24 view for growing vegetation, then I think both parties
25 would benefit from that venture.

1 Q. Agriculture, you said that this is
2 things you wouldn't eat?

3 A. Did I say agriculture?

4 Q. Well, you said that in the
5 transcript, line 24, soil modifier in agriculture.
6 When I hear the word agriculture I think about eating.

7 A. I doubt very much it would be used in
8 soils that would be used for growing crops for human
9 consumption.

10 Q. Okay. Now, you say on page 18906
11 that you are trying to mix cement with this flyash to
12 stabilize it, line 6, to find out if find out of
13 cement-stabilized flyash could be used as lake fill.
14 And again we are talking lake fill, not landfill.

15 So is Ontario Hydro proposing that if
16 they can stabilize the leachate with cement, that they
17 would use it as a lake fill?

18 A. If we were able to show
19 experimentally that the leachate was markedly reduced
20 the addition of a small amount of cement, then we would
21 approach the Ministry of the Environment to see if they
22 would review the category that they have now, that the
23 Ministry has now given to flyash inasfar as it's not
24 now capable of being used as a lake fill product.

25 [12:20 p.m.]

1 Q. And why would Ontario Hydro want to
2 put in it in a lake? I don't understand.

3 A. It's one of many options that we are
4 examining for disposal and uses of flyash.

5 Q. It's not going to be good for the
6 lake; is it?

7 MR. DAWSON: A. I think the premise is
8 that if you add cement to the flyash then you can fix
9 the flyash to the point where the leachate is
10 acceptable and, in fact, won't be bad for the lake.
11 That's the whole point. And that's something we are
12 working on and we are talking to the Ministry of
13 Environment about it and that's where it is at right
14 now. We have got some experimental data that suggests
15 that that might be a feasible route to go.

16 Q. But who would want a cement-bottomed
17 lake?

18 A. What we are looking at is, for
19 instance, the Mississauga proposal to create an island
20 park system off-shore Mississauga. It may provide some
21 fill for that sort of an endeavour.

22 Q. That's fill though.

23 A. Well, that's what we are talking
24 about.

25 Q. So you are going to put it out into

1 Lake Ontario. So it's the people of Mississauga that
2 want this?

3 A. It may be. I don't know. As I say,
4 it's an experimental program right now that may lead to
5 that sort of an application ultimately.

6 Q. So you are not talking about
7 disposing of it like they dispose of the uranium
8 tailings where they just dump it on the bottom of a
9 lake? You are talking about using it so that you would
10 have a structure above the surface of the lake?

11 A. That's right.

12 Q. I understand.

13 A. As a managed fill that would create
14 part of this island structure that Mississauga has been
15 looking at, yes.

16 MS. PATTERSON: Are you also looking at
17 it as an ingredient for regular cement as a building
18 material?

19 MR. DAWSON: Yes, we also supply it to
20 the cement industry and they add it to the kiln as a
21 mix with their limestone in the creation of cement too,
22 and all the Lakeview ash goes to that purpose right
23 now.

24 MS. PATTERSON: But you can't sell it all
25 for regular cement purposes as opposed to lake fill?

1 MR. DAWSON: No, we are looking at some
2 other proposals along those same lines to use it for
3 cement production. Some of the ash from Nanticoke may
4 go for that use too, but they are currently being
5 negotiated and looked at.

6 MR. BURPEE: I would also like to add.
7 Some of the Thunder Bay ash is actually used in place
8 of cement for mine backfilling, so they offset the
9 requirement for Portland cement with the ash as the
10 right properties they need.

11 MR. GREENSPOON: Q. If I could move on,
12 I think, to Mr. Meehan. Ml of your overheads, Mr.
13 Meehan.

14 MR. MEEHAN: A. Yes, I have it.
15 Q. That is the map of the stations. I
16 wondered about if we could just quickly go through or
17 maybe you can give me a ballpark figure on the
18 efficiency of these plants.

19 A. The thermal efficiency?

20 Q. Yes.

21 A. Mr. Dawson might know a little bit
22 more about that. They are all about the same I would
23 think.

24 MR. DAWSON: A. I couldn't tell you
25 specifically what the thermal efficiency is of each of

1 the stations. They are around 35 per cent.

2 Q. What about the environmental controls
3 on these stations.

4 MR. MEEHAN: A. What is it you mean by
5 environmental controls?

6 Q. The controls that we have heard about
7 that Dr. Effer gave in his direct evidence, baghouse
8 filters, precipitators, scrubbers. Which of these
9 plants are....

10 A. With respect to acid gas, I think my
11 direct evidence tried to cover that in some detail.
12 For reducing sulphur dioxide, the installations would
13 include such things as the coal blending facility at
14 Nanticoke, the flue gas conditioning facilities at
15 Nanticoke and Lambton --

16 Q. Let's approach it from another angle.
17 Let's start up at Atikokan and let me ask
18 you -- that's the newest plant in Ontario?

19 A. That's true.

20 Q. What pollution control is installed
21 at Atikokan?

22 A. There is none of what I discussed
23 installed at Atikokan. Atikokan does have, I think,
24 the better precipitators, the newest and the most
25 efficient precipitators for particulate removal. It is

1 also is burning a very low sulphur coal from
2 Saskatchewan and I believe it has low NOx burners in it
3 as well. So because it is the most modern plant, it
4 has all of the equipment that was available at that
5 time.

6 Q. So will Hydro be putting scrubbers on
7 Atikokan?

8 A. It's not intended to put scrubber at
9 Atikokan?

10 Q. Why is that.

11 A. I think it depends on the value that
12 we get for the dollars we spend. We get a far better
13 value from the dollars that we would spend on the
14 environment to put them elsewhere.

15 Q. Is that because it puts out less
16 sulphur dioxide than some of the other plants?

17 A. Yes, per kilowatthour produced.

18 Q. What kind of a factor are you talking
19 about, difference?

20 A. It depends on the percentage in the
21 sulphur of the other stations, but certainly it would
22 be in the order --

23 Q. Well, have we got a station we could
24 compare it to in terms of Saskatchewan coal?

25 A. If we compare it with Lambton, for

1 example - I am going to need some help from Mr. Dawson
2 I believe - but if Lambton were burning, with flue gas
3 conditioners, I believe we are burning about 0.8 per
4 cent sulphur coal with flue gas conditioners in place.
5 And at Atikokan we are burning 0.4 per cent sulphur
6 coal, but it is on a different heat base, I guess, is
7 it?

8 MR. DAWSON: A. It's about, you would
9 have to almost double that, maybe a bit less than
10 double --

11 Q. How many tonnes of sulphur dioxide
12 does Atikokan put out a year?

13 MR. SMITH: A. Depends how much the
14 plant is used.

15 Q. All right. Last year?

16 A. I would say we probably used - this
17 is without specific information in front of me - we
18 probably burned about 500,000 or 600,000 tonnes of
19 lignite at that plant in 1991.

20 Q. Okay. So, it would have produced
21 using our multiplication factor, it would have produced
22 that amount of sulphur dioxide based on the 0.4 per
23 cent this time?

24 A. Yes.

25 Q. Of sulphur dioxide. So that's a lot

1 of sulphur dioxide that you could scrub out with
2 scrubbers; isn't that right?

3 A. It is a very small amount of the
4 total sulphur dioxide that we emit across the province
5 and we are well below the emissions limits that have
6 been set by the province, so it would be a trivial
7 amount improvement in the total emission package in
8 Ontario at a very high cost.

9 Q. How many megawatts did you generate
10 with that half a million tonnes of coal? That's
11 about -- you said you burned 10 million tonnes of coal
12 last year --

13 A. The unit is 200 megawatts. It
14 probably ran at - I have no idea what the capacity
15 factor would be - maybe 600 gigawatthours of output.

16 Q. Well, okay. I'm confused. You
17 burned 10 million tonnes of coal last year?

18 A. Approximately.

19 Q. And you burned a half a million at
20 Atikokan?

21 A. That's correct.

22 Q. So that's one-twentieth of your coal?

23 A. That's right. And its emission rate
24 is about half of the other coal or less than half of
25 our other coals that we use.

1 Q. Well, yes, but you said what your
2 emission rate was. It was 0.4 per cent--

3 A. That's correct.

4 Q. --sulphur, okay.

5 So to you that's a trivial amount of --
6 that's one-twentieth of your emissions --

7 A. What I said was -- I don't believe it
8 could possibly be one-twentieth of our emissions, so we
9 are doing some of the math wrong somewhere.

10 Q. Well, now just a second --

11 A. I said it was 500,000 tonnes of 10
12 million tonnes. That's one-twentieth.

13 Q. That's right.

14 A. At half the, at less than half of the
15 emission rate of the other coals we use, so I then come
16 up with maybe one-fortieth. And I said that we were
17 well below the emission limit in total that we are
18 required to meet. What I am saying is that on the
19 relative scale of things that we should do to meet
20 environmental restrictions or improve the way we meet
21 those, that would be one of the last places we would
22 want to spend money on scrubbers.

23 Q. That might be too bad for the people
24 in Atikokan though, wouldn't it, because that's where
25 the sulphur dioxide is put out.

1 A. I would also point out that the
2 emission rate of that plant, as equipped, is equivalent
3 to the emission rate that we might get at another plant
4 fully equipped with scrubbers.

5 Q. Just going back to your percentage -
6 I don't want to pursue this too far - but you burn coal
7 that is less than 0.4 per cent as well?

8 A. Some of our coal is, yes.

9 Q. Some of your coal. So it wouldn't be
10 fair to cut that figure in half again, would it?
11 Because 0.4 is --

12 A. The average sulphur content of all
13 the coal we burned in our plants last year was somewhat
14 under 1 per cent, just slightly below 1 per cent. So
15 in fact yes, it would be fair to cut it in half; it's
16 more than half.

17 Q. All right. Because you burned more
18 of the 0.8 per cent, 0.8 per cent coal then I take it?

19 A. Quite a bit more, yes. And we burned
20 some coal that is above 0.8 per cent at Lakeview, for
21 example.

22 Q. I understand that is primitive math
23 because this isn't the way you look at it, but let's
24 say it is a fortieth.

25 A. I beg your pardon?

1 Q. Let's say it's a fortieth of your
2 emissions.

3 A. Okay.

4 Q. So how many tonnes of sulphur dioxide
5 is that? You are putting out three hundred and -- Dr.
6 Effer, how many tonnes are you putting out right now?

7 DR. EFFER: A. I think we have some data
8 in Exhibit 468 on the amount of emissions per station.
9 I am trying to find that.

10 MR. SMITH: A. I am looking at a table
11 from the 1988 State-of-the-Environment Report, which is
12 Exhibit 19, is that correct? And it lists the SO(2)
13 emissions in 1988 from all of our plants.

14 Q. At?

15 A. Atikokan had 5,000 megagrams.

16 Q. Which is 5,000 tonnes.

17 A. Yes.

18 Q. So you are going to put out 5,000
19 tonnes that you could stop with scrubbers and you are
20 not going to put the scrubbers on because it's not
21 economic?

22 A. We are not putting the scrubbers on
23 because we are not required to do that to meet the
24 environmental regulations that we have.

25 MR. MEEHAN: A. It is more

1 cost-effective to put them into Lambton and to
2 Nanticoke.

3 Q. But who asks the question: Where is
4 it more cost-effective? And why isn't the question
5 being asked: Why don't you put them on them all? Why
6 do you come at it from the point of view of where is it
7 cost-effective instead of from the point of view that
8 is subscribed to in your environmental statement in
9 Exhibit 344, which we read this morning, which says:

10 The first environmental control
11 principle is to eliminate emissions where
12 practicable. This can be accomplished
13 through the selection of processes which
14 avoid waste production or by the use of
15 zero discharge or recycling systems.

16 A. I think that we can't ignore the
17 costs of what it is we are doing either. I take the
18 point that you are making that if we were to install
19 these things on all our generating facilities, we would
20 in fact reduce our emissions and we would do that at
21 considerable cost. So I think we are trying, as I said
22 in my direct evidence, to walk a line between cost and
23 environmental benefit.

24 Q. There is a lot more fish and a lot
25 more trees up around Atikokan than there are around

1 Lakeview.

2 A. I don't think the SO(2) problem or
3 the acid rain problem is necessarily a local problem.

4 Q. Well, it certainly is around Sudbury
5 where we have witnessed it there.

6 MR. SMITH: A. Yes, and I would guess
7 without having scientific basis for this comment that
8 the emission rates that we have at Atikokan are far
9 less than they ever were in Sudbury before that damage
10 occurred.

11 Q. Well, I won't debate it with you but
12 some of the worst damage in Sudbury was done when there
13 were not smelters, when they were just burning a small
14 amount of ore, but that is maybe for another hearing at
15 another time.

16 In any event, you have decided that the
17 plant at Atikokan won't have scrubbers. What about the
18 plant in Thunder Bay?

19 MR. MEEHAN: A. The current plants don't
20 have scrubbers. The updated plan doesn't have
21 scrubbers going into Atikokan.

22 I'm sorry, what was your next --

23 Q. Thunder Bay.

24 A. Thunder Bay. The same is true at
25 Thunder Bay with respect to scrubbers. Again it is

1 burning the same kind of coal as we have at Atikokan.

2 Q. And it's a bigger plant, two by 150s?

3 A. That's correct.

4 Q. So, would it be fair to say it's
5 running about the same amount as Atikokan, it might
6 burn a little more?

7 A. Generally speaking they are loaded
8 about --

9 Q. About the same?

10 A. Similarly, yes.

11 Q. So in that area, Atikokan/Thunder
12 Bay, we are looking at about 10,000 tonnes of sulphur
13 dioxide a year?

14 A. This 1988 reports indicates just
15 overs 5,000 tonnes at Atikokan and 9,500 tonnes at
16 Thunder Bay.

17 Q. So 14,500 tonnes a year of sulphur
18 dioxide in the Thunder Bay/Atikokan area?

19 A. That's correct. In 1988.

20 MR. BURPEE: A. In 1988 was their
21 highest generation that they have ever had, those two
22 stations put together.

23 Q. How much different is it going to be
24 this year?

25 A. Well, I'm not sure about this year.

1 But over the next few years it's probably half of what
2 it was then.

3 Q. And when will that be?

4 A. Probably starting around 1994/95.

5 Q. And what do you base that on?

6 A. The CES, consistent energy set, which
7 is an energy prediction.

8 Q. This is part of the forecasting that
9 Ontario Hydro has done?

10 A. Yes. Mr. Smith showed a slide that
11 that had part of that prediction in it.

12 Q. Well, we have certainly seen the
13 inaccuracy of Ontario Hydro's forecast over the length
14 of this hearing.

15 A. They do change sometimes.

16 Q. And I take it if we went through the
17 rest of these stations, we would find some more that
18 weren't being fitted with scrubbers?

19 MR. MEEHAN: A. That's correct.

20 Q. Which ones are those?

21 A. Lakeview, and Lennox.

22 Q. Now how many megawatts or how many -
23 maybe it is not megawatts, maybe it's kilowatts - do we
24 get out of a tonne of coal at 35 per cent?

25 MR. SMITH: A. About 2-1/2 megawatthours

1 out of 1 tonne of coal, I believe.

2 Q. 2-1/2 megawatthours?

3 A. But Mr. Dawson, maybe you are going
4 to calculate that for us and get it exactly right.

5 MR. DAWSON: A 300-megawatt unit uses a
6 100 tonnes of coal an hour --

7 THE CHAIRMAN: I didn't hear that.

8 MR. DAWSON: I'm sorry.

9 A 300-megawatt unit, for instance,
10 Lakeview, will consume about 100 tonnes of coal every
11 hour.

12 MR. GREENSPOON: Q. The other question I
13 had related to that was if you had -- how many btu's
14 there are in a tonne of coal?

15 A. In a tonne of coal is roughly 25
16 million Btu's.

17 MR. SMITH: A. Depends on the coal.

18 Q. You wouldn't disagree with that as a
19 mean figure?

20 A. Well, a U.S. coal that we purchase in
21 fact contains about 26 million btu's per ton. Western
22 Canadian coal contains about 22 million btu's per ton.
23 Lignite contains about 14 million btu's per ton..

24 DR. CONNELL: Are we talking metric
25 tonnes?

1 MR. SMITH: No. We are talking btu's and
2 I am talking short tons, sorry.

3 MR. GREENSPOON: All right.

4 MR. SMITH: I believe I had an exhibit
5 that showed it in -- I'm sorry, it does not have the --
6 yes, it has the heat content in megajoules per
7 kilogram. It was my overhead S13 of Exhibit 474 and it
8 showed all of the coals we currently use.

9 [12:50 p.m.]

10 MR. GREENSPOON: Q. Thank you.

11 I think I asked you a question when we
12 were talking about the environmental efficiency or the
13 efficiency of the thermal discharge. I asked you if
14 you thought that that could be addressed with the idea
15 of smaller decentralized combustion units, and I think
16 you agreed that that was a possibility, Mr. Dawson.

17 MR. DAWSON: A. Yes, I think I said
18 theoretically it's feasible, yes.

19 Q. Now, I wanted to ask you about the
20 efficiency of smaller units as well. You said that
21 these units that we use in Ontario are around 35 per
22 cent efficient?

23 A. That's right.

24 Q. Let's talk about 1 megawatt units,
25 smaller units that burn fuel, these kind of fuels, coal

1 or natural gas.

2 A. Right.

3 Q. Are they more efficient than 35 per
4 cent?

5 A. No.

6 Q. The same efficiency?

7 A. Less efficient.

8 Q. Be less efficient?

9 A. Yes.

10 Q. So the advantage then with the
11 smaller unit is that it can be hooked up to a
12 cogeneration, that's where the real advantage comes in?

13 A. That's right.

14 Q. In fact, if you turn to --

15 MR. MEEHAN: A. Is this a coal-fired
16 unit that you are talking or a natural gas-fired unit?

17 Q. Either one.

18 A. Well, I think there is a difference
19 in the efficiency, if you are talking about a
20 combustion turbine or a combined-cycle unit, compared
21 to the coal-fired unit that we have been talking about.

22 Q. Oh, I thought Mr. Dawson's evidence
23 was that all of these plants run at about 35 per cent.

24 A. All of the plants that we have on the
25 system are coal-fired or the oil-fired unit.

1 Q. Right.

2 A. But they are conventional steam cycle
3 plants.

4 Q. Do the natural gas plants run at a
5 different efficiency?

6 A. If they are combustion turbine or a
7 combined-cycle plant they would have different
8 efficiencies.

9 Q. Is it better or worse?

10 A. It is better and worse, a combustion
11 turbine is worse and a combined-cycle plant is better.

12 Q. So combined-cycle gas is better than
13 combined-cycle coal, but combustion turbine gas is
14 worse than combustion turbine coal; is that what
15 you are saying?

16 MR. DAWSON: A. Well, there isn't such a
17 thing as a combustion turbine that runs on coal.

18 Q. No.

19 A. But other than that, yes, what you
20 said was correct.

21 Q. All right. Anyway, if we can look at
22 the cogeneration system that's depicted in Exhibit 344
23 on page B14, which is the last tab again of the
24 appendices, and it's B2-5, paragraph dot 7, overall
25 fuel energy conversion efficiency ranges between 55 and

1 80 per cent, and is the sum of the thermal recovery and
2 electrical conversion efficiencies of a cogeneration
3 system.

4 Is that Hydro's position, that those
5 figures are still accurate about the recovery of
6 efficiency from cogeneration?

7 A. Yes, it depends on the amount of
8 steam used relative to the amount of electrical
9 generation, but within that range would seem
10 reasonable.

11 Q. And there is a 200 megawatt
12 cogenerator at Sarnia, at Dow Chemical?

13 A. Yes, I believe that's quite possible,
14 yes.

15 Q. And Great Lakes Power and Algoma
16 Steel are proposing a 200 megawatt cogenerator as well?

17 A. They may be. I am not aware of it.

18 Q. So we are going to get more
19 efficiency when we generate in that manner and just to
20 put it in perspective, cogeneration can be in the
21 magnitude of Atikokan or Thunder Bay?

22 A. That is correct.

23 Q. Fossil plants?

24 A. Yes.

25 Q. I can't seem to identify which

1 witness it was, if we could go to page 18925, maybe one
2 of you -- I think it was you, Mr. Meehan, talking about
3 the impact that the update would have from a planning
4 perspective on the retirements of the fossil. Yes,
5 that was you; wasn't it?

6 MR. MEEHAN: A. Very likely.

7 What page are we on?

8 Q. 18925.

9 A. Yes, it looks like me.

10 Q. Now, I just want to be clear in my
11 mind. At line 19 Mr. Howard asked you:

12 What kind of change is this from a
13 planning perspective?

14 It's not a big change or it's not a
15 small change.

16 And then you say at the top of the next
17 page:

18 The initial need date for new
19 generation might be deferred by one year.

20 And then you go on to say at line 11:

21 If we assume that we would replace
22 existing generation because of its
23 retirement, there is no change that would
24 occur until 2009.

25 A. Yes, I see that.

1 Q. I just want to refer to you Exhibit
2 3, which is the plan, page 14-22 -- I'm sorry, I have
3 the wrong reference, page 15-21.

4 A. I have it.

5 Q. Or you can see the same thing on the
6 next page which is figure 15-19. You are just talking
7 in your evidence about retirements. There is a big
8 change in the plan for Ontario Hydro because of the
9 update. If you look at figure 15-18, you were going to
10 build a CTU in 1993 under Case 24.

11 MR. SHALABY: A. This is under upper
12 load growth.

13 Q. Well, you were planning for the upper
14 load growth under the DSP, weren't you?

15 A. Planning doesn't mean build.

16 Q. You were planning to build?

17 A. We were being prepared to build.

18 Q. Well, I think it is semantics, Mr.
19 Shalaby.

20 A. It may be.

21 Q. You were planning to build. You were
22 forecasting under the upper load forecast that this is
23 what you would need in 1993?

24 A. If we felt that the upper load
25 forecast would materialize, that's what we will need

1 yes.

2 MR. MEEHAN: A. We were preparing for
3 that eventuality.

4 But I wasn't meaning in my direct
5 evidence to imply that there haven't been big changes
6 from the update. Certainly there have been big
7 changes.

8 What I was saying was that the life
9 extension assumption and the change in that assumption
10 was not a big change in one respect, but in fact was a
11 big change in another respect.

12 MR. GREENSPOON: Okay. This would be a
13 good place to stop. I am probably going to take until
14 the afternoon break.

15 THE CHAIRMAN: Thank you. We will
16 adjourn now until 2:30.

17 THE REGISTRAR: This hearing will adjourn
18 until 2:30.

19 ---Luncheon recess at 1:00 p.m.

20 ---On commencing at 2:30 p.m.

21 THE REGISTRAR: Please come to order.
22 This hearing is again in session. Be seated, please.

23 THE CHAIRMAN: Mr. Greenspoon?

24 MR. GREENSPOON: Thank you, Mr. Chairman.

25 Q. Mr. Smith, I think this might be your

1 area of expertise. I was interested to know about the
2 coal for the life extensions. Where does Hydro propose
3 to get that coal?

4 MR. SMITH: A. I think we have
5 identified that the basic sources of coal would
6 possibly be the same sources we have today. Depending
7 on what we do with the units, for example, if they were
8 in fact all equipped with scrubbers, then most likely
9 the coal could come from the traditional region in the
10 United States that we purchased in, Pennsylvania, West
11 Virginia.

12 Q. And are you currently negotiating
13 contracts for that coal?

14 A. No.

15 Q. You are not negotiating contracts?

16 A. No.

17 Q. Are you renegotiating existing
18 contracts for the life extensions?

19 A. Not for life extensions, no.

20 Q. Are you renegotiating any contracts
21 for any other reasons?

22 A. Most of the contracts we have today
23 require price negotiation every year. So at the
24 moment, no, I am not renegotiating any contracts. We
25 are looking at the Canadian coal supply situation.

1 Q. Okay.

2 MS. PATTERSON: Does that mean that you
3 are looking at the Canadian coal supply situation?

4 MR. SMITH: Yes.

5 MS. PATTERSON: Yes?

6 MR. SMITH: We are looking at that, yes.

7 MS. PATTERSON: What do you mean by that?

8 MR. SMITH: The contracts expire this
9 year, any existing contracts, and well, we are in the
10 process of looking at whether we will continue to
11 purchase that coal after these contracts expire.

12 THE CHAIRMAN: I take it most of the
13 contracts do have price adjustment provisions in them;
14 is that correct, annual review of prices?

15 MR. SMITH: Most of the contracts we have
16 today are of that nature, yes.

17 THE CHAIRMAN: So you regard those as one
18 year contracts?

19 MR. SMITH: No. Most of them are
20 three-year contracts. We call them a three-year
21 evergreen contract.

22 What we do in those contracts is we
23 establish the first year price through negotiation and
24 then we negotiate each year the next year's price. On
25 the assumption that we can agree and none of the other

1 conditions change, we then make the contract -- keep
2 rolling it over and make it a three-year contract.

3 If we don't agree on price, we go into a
4 termination mode during which the last two years of the
5 contract, the price adjusts by an inflation formula, an
6 escalation formula.

7 THE CHAIRMAN: How far out in advance do
8 you want to have contract provisions? You have
9 contracts for how far?

10 MR. SMITH: We used to have contracts
11 that were 20, 30 and 40 years in length. What I try to
12 do today is to have very short contracts with lots of
13 flexibility, because the amount of fuel we need to
14 purchase is quite variable and we have not been well
15 served by the very long-term contractual arrangements
16 of the past.

17 MR. GREENSPOON: Q. So your answer is
18 you are not negotiating right now for these life
19 extensions?

20 MR. SMITH: A. That's correct.

21 Q. The coal that you are going to need
22 for those?

23 A. That's correct.

24 Q. And you are not doing anything out of
25 the ordinary in your contractual negotiations on the

1 coal that you need for the existing stations?

2 A. No, I am not sure what you mean by
3 out of the ordinary, but no, I would say we are not.

4 Q. As the Chairman asked in his
5 questions, you are just continuing on in the same
6 process?

7 A. That's correct.

8 Q. Now, Dr. Effer, I just wanted to go
9 back to something you said in direct, and that is that
10 on page 18864, Mr. Howard asked you if the six
11 environmental issues that - I don't think you need to
12 turn it up - the six environmental issues that you were
13 going to speak to, whether you considered that those
14 were regionally localized within Ontario's boundaries.
15 And your answer was:

16 Not by any means. For example, acid
17 rain and ozone have effects extending
18 beyond the borders of Ontario and into
19 the North American continent.

20 So does Ontario Hydro feel that it has a
21 responsibility for its environmental impacts from
22 fossil and other environmental impacts to other
23 provinces and to other countries, or does the
24 responsibility just rest in Ontario?

25 DR. EFFER: A. The responsibility lies

1 in conforming to the appropriate regulations some of
2 which are federal and some of which are provincial, and
3 we do conform to measures which do have transprovincial
4 boundary levels. So our responsibilities to conform to
5 effects outside the province do exist.

6 Q. But just to remind you of the
7 principle that we talked about earlier this morning, in
8 Exhibit 344, when Ontario Hydro talks about its
9 environmental principles, its corporate policy, it
10 says:

11 The principles will express
12 fundamental values on environmental
13 leadership, decision-making, wise
14 resource use, consultation and
15 responsibility.

16 So, surely, Ontario Hydro doesn't take
17 the position that it will only meet regulations. It
18 must have a view on its moral responsibility to other
19 provinces and to other nations with respect to its
20 emissions?

21 A. I think it is up to the province, the
22 Government of Ontario to establish what its position is
23 with relationship to other provinces in respect to
24 trans-boundary effects. If the Government of Ontario,
25 the regulatory agencies of Ontario come to agreements

1 with other provinces or even with the United States
2 areas, then we will conform to whatever regulations are
3 developed between those bodies.

4 Q. All right. I wanted to ask a
5 question about the gas prices. Now, in your update on
6 page 19, that's Exhibit 452, I don't know who is the
7 gas expert. Mr. Smith, is that you?

8 MR. SMITH: A. I will try to answer the
9 questions on natural gas.

10 Q. Your forecast on page 19 of the
11 update is the dotted line; is that true?

12 A. Yes, the Ontario Hydro forecast
13 that's shown there.

14 Q. And that forecast for gas sees the
15 price of going up to the year 2010, pretty well a
16 straight line increase with a couple of curves back
17 down?

18 A. Yes.

19 Q. Now is that in keeping with the gas
20 future market in the United States?

21 A. I am not aware that the gas future
22 market goes more than about two years ahead.

23 Q. Isn't it true that there is quite a
24 bit of evidence that gas prices may not increase at all
25 between now and the year 2014?

1 A. As we have displayed in that exhibit,
2 there are different forecasters who have different
3 views of the future price of natural gas and there is a
4 school of thought that suggests that gas prices may not
5 go up as much as the conventional forecasting people
6 have suggested, including Ontario Hydro.

7 Q. In fact, there is two straight lines
8 at the bottom, the Calgary consultants and the Calgary
9 banks?

10 A. Yes.

11 Q. So has Ontario Hydro ever thought
12 about buying gas futures if they think the price is
13 going to go up?

14 A. As I have said before, the gas
15 futures market is not a long-term market, so we don't
16 have any apparent need for natural gas for sometime, so
17 it wouldn't be a market that would serve us.

18 We are aware that there are lots of
19 things could you do if you believe that you are going
20 to be a major user of gas, if you believe it's going to
21 be a shortage of gas and if you think prices are going
22 to go up. Things you could do would be invest in the
23 business, participate in exploration, perhaps purchase
24 reserves in the ground. But we are not actively
25 considering any of those alternatives.

1 Q. Now, just getting back to the issue
2 of out of province impacts, Dr. Effer. What is Ontario
3 Hydro's view as to their responsibility for the
4 environmental impacts where the coal is mined?

5 DR. EFFER: A. I think this has been
6 addressed in previous discussions.

7 Essentially, though, that we enter into
8 contracts and stipulate to the contractor that he
9 will -- it's not stipulate. We assume that he will be
10 conforming to the appropriate regulations pertaining to
11 the mining of that fuel, and that forms part of the
12 contracts. And we will also make sure that if we have
13 any changes of regulation during the course of that
14 contract, we will meet with the supplier and make sure
15 that he is aware of the changes that might occur in our
16 contract.

17 Q. But we don't know, Ontario Hydro
18 doesn't know whether the minimum standards, for
19 example, in the United States --

20 THE CHAIRMAN: Extract a covenant, as I
21 understand it, from the supplier that they will conform
22 with the local regulation; is this not correct?

23 DR. EFFER: Yes.

24 MR. SMITH: I wouldn't want to mislead
25 the Board. We don't have that in every contract at all

1 at the moment. This is an evolving situation in
2 response to the environmental issue, and making that a
3 term of the contract is something that we are in a
4 transition phase and so we do not have that in every
5 contract. However, all of our supplies must meet
6 environmental regulations for their jurisdiction
7 otherwise they wouldn't be operating.

8 MR. GREENSPOON: Q. Yes. And my next
9 question was going to be, we don't know if those
10 standards are up for snuff for minimum Ontario
11 standards, do we, and in fact, Ontario Hydro doesn't
12 care? If the Kentucky mining meets the Kentucky
13 standards, it doesn't matter whether those would meet
14 health and safety or environmental standards in Ontario
15 to Ontario Hydro; is that right?

16 MR. SMITH: A. We don't try to influence
17 the regulation in other jurisdictions. I think that
18 would be a fair answer to your question.

19 [2:45 p.m.]

20 Q. Nor do you buy coal from
21 jurisdictions that meet Ontario standards only. You
22 don't restrict your purchases of coal to coal that
23 meets Ontario standards.

24 A. No, we don't.

25 Q. Mr. Meehan, on page 19086, I am in

1 Volume 109 now. 19086.

2 MR. MEEHAN: A. Yes, I have it.

3 Q. I am just wondering if your answer on
4 line 7 is affected by the update, by the load forecast?

5 A. In what respect?

6 Q. In the percentage average load
7 factor.

8 A. No, that wouldn't be affected by the
9 update. I think that what we are doing here is just
10 defining the range of capacity factor that we would
11 refer to as a base load.

12 Q. That base load capacity factor hasn't
13 changed as a result of the Update?

14 A. The load on generating units may
15 change from what they might have been in the previous
16 plan, but the definition of what we would refer to as
17 base load is still that load above 60 per cent capacity
18 factor.

19 Q. All right. I am going to move on now
20 to what Hydro calls alternatives.

21 Mr. Shalaby, this is your area, or yours
22 and Mr. Dawson's. I will start with you, Mr. Shalaby.
23 I wondered what your role was at Ontario Hydro with
24 regard to what you have called alternative energy
25 sources?

1 MR. SHALABY: A. Well, within the system
2 planning function, I have been associated with the
3 technologies that have been labelled various things,
4 most recently alternative energy sources.

5 Q. And this is different than nuclear
6 generation or fossil generation?

7 A. It is different, yes.

8 Q. You are a system planner. There is
9 no alternative division at Ontario Hydro?

10 A. There isn't.

11 Q. It is moved up into system planning?

12 A. No. You asked me what my role was.

13 Q. Yes.

14 A. You didn't ask me where the work gets
15 done. The work gets done in the Design and Development
16 Division, Generation. That's the division that Mr.
17 Dawson and Dr. Effer are with. So my role is the
18 system planning aspect, the economic evaluation, the
19 integration into an integrated plan. But the work is
20 done elsewhere.

21 Q. Why is it that the people that did
22 the work, why didn't they present the evidence, like in
23 the nuclear panel and the fossil panel? Why is it that
24 a system planner is presenting the evidence that he
25 really did from a planning perspective?

1 A. Because this is a planning hearing in
2 my view.

3 Q. Yes, but --

4 A. And you would need about three rows
5 of tables if you wanted the people who prepared the
6 evidence to come and present it.

7 Q. But Mr. Smith, Mr. Meehan, Mr.
8 Burpee, and Mr. Dawson are certainly more on the ground
9 with respect to fossil than you are with respect to
10 alternatives.

11 A. I disagree with that.

12 Q. You disagree with that, okay.

13 Not that I want to be critical.

14 Northwatch likes the fact that a system planner is
15 doing the alternatives. I am just curious, we are
16 wondering if it is going to get the same role as other
17 generation --

18 A. I wonder what you would be like if
19 you were critical. [Laughter]

20 Q. I'm sorry?

21 A. I wonder what it would look like if
22 you were critical.

23 MR. HOWARD: Anyway it's my fault.

24 MR. GREENSPOON: That's my job, Mr.
25 Shalaby.

1 Q. So what division wrote this exhibit.

2 MR. SHALABY: A. This was a
3 collaborative effort between people from system
4 planning division, people in research division, people
5 in design and development division, and some input from
6 people in public hearings as well.

7 THE CHAIRMAN: I take it by this exhibit
8 you mean 344?

9 MR. GREENSPOON: By this exhibit I mean
10 344, the alternative energy review.

11 Q. So the rumours that are going around
12 through the grapevine that said the nuclear physicists
13 that are out of work, they didn't write this? Those
14 aren't true?

15 MR. SHALABY: A. I told you who wrote
16 the report.

17 Q. Okay. Just while I am on that point,
18 going back to fossil just for a minute. Given that
19 there is no approvals being sought for fossil and no
20 planned new generation, what is the future of the
21 fossil division? Are there going to be layoffs in the
22 fossil division?

23 MR. HOWARD: Mr. Chairman, I hesitate to
24 rise but I am sure this panel doesn't know what the
25 plans of Hydro are with respect to layoffs in the

1 fossil division. I don't see what it has to do with
2 this hearing either.

3 THE CHAIRMAN: Well, I take it that the
4 fossil division is an active and alive division which
5 is going to be involved in producing electricity for
6 the foreseeable future.

7 MR. GREENSPOON: So there are no plans.
8 I gather that's what Mr. Howard is saying.

9 Q. Getting back to the renewables then
10 or alternative energy sources, as they are called.

11 Mr. Shalaby, you would agree with me, now
12 that I have mentioned the word renewable that solar,
13 wind and biomass, as differentiated from some of the
14 alternative sources, are renewables?

15 MR. SHALABY: A. The fuel for them is
16 renewable, yes.

17 Q. As opposed to nuclear and fossil
18 which are clearly not renewable?

19 A. The fuel is not, correct.

20 Q. Now are you aware that in California
21 just this past week they have decided that 50 per cent
22 of their new supply is going to come from photovoltaic
23 and wind?

24 A. No, I am not.

25 Q. Just as I have heard you often say in

1 your evidence that you have given about planning, you
2 are an advocate of a mix of generation in terms of the
3 non-renewables, the standard Ontario Hydro types of
4 generation? You like to see a mix of hydraulic, fossil
5 and nuclear?

6 A. That's worked well in the past and we
7 see it working well in the future.

8 Q. That's also true of the renewables,
9 isn't it, that if you are going to rely on renewable
10 power it would be good to have a mix of photovoltaic
11 wind, fuel cells, biomass?

12 A. Well, I guess they are more related
13 to -- it depends where you are implementing that. Some
14 countries would find various forms more attractive than
15 others. It's resource based.

16 Q. Let's say hypothetically, because I
17 know you don't take this position - or at least you
18 didn't in direct - let's say hypothetically that
19 biomass, photovoltaic and wind are viable sources of
20 energy in Ontario, economically viable, environmentally
21 appropriate. The best way would be to have a mix of
22 all three. Just as with the other generation sources,
23 these sources would be better if they were mixed?

24 A. A mix offers advantages, yes.

25 Q. Now what is Ontario Hydro's position

1 on purchasing of these alternative technologies; that
2 is, from a non-utility generator?

3 A. The same as purchasing of electricity
4 from other sources.

5 Q. Right. Okay. So the individual who
6 had, like Mr. Cuyler, the fellow that we saw here
7 earlier, the individual who had one of these sources on
8 his home, if he was hooked into the grid, he wouldn't
9 be able to turn his meter backwards, would he, if he
10 was generating electricity because you wouldn't pay him
11 what he has to pay you?

12 A. That's correct.

13 Q. So how would he do that? Would he
14 have to have two meters.

15 A. If it is a large enough facility,
16 yes.

17 Q. Well, regardless of whether it's
18 large enough, if he was generating electricity that he
19 wasn't using at a windy time or a good time for
20 photovoltaics, even if it was a small amount and he
21 wanted to sell it back to Hydro, he would have to sell
22 it at a rate considerably less than what he would have
23 to pay the next day for the same electricity?

24 A. That's correct.

25 Q. Now you had a chart where you talked

1 about active and passive solar.

2 A. I am assuming -- my answer is
3 because -- I know Mr. Cuyler lives in a rural area he
4 pays rural electricity rates which are higher than
5 municipal rates, so my answer applies to that
6 particular example. There may be other examples where
7 people would sell at higher rates than what they buy
8 for.

9 Q. Where would that be?

10 A. A large industrial outfit.

11 Q. So if somebody was on the declining
12 block rate structure, they might. That's what you
13 mean?

14 A. Yes.

15 Q. But for most small users, whether
16 they are rural or urban, they are going to pay more
17 than the avoided cost for electricity?

18 A. In all likelihood.

19 Q. Quite a bit more?

20 A. In all likelihood, yes.

21 Now there are time-of-use rates -- I
22 don't like to complicate matters. In general, yes, but
23 there are time-of-use rates and other things that could
24 make that not universally correct.

25 Q. It would be pretty rare when a small

1 producer would get paid more than what he was buying
2 electricity for? I think you would be hard-pressed to
3 find an --

4 A. If he is on time-of-use rates, it may
5 not be that rare.

6 Q. And Hydro will facilitate this
7 procedure?

8 A. The sale of electricity?

9 Q. Yes.

10 A. Yes.

11 Q. How many of those are installed in
12 the province?

13 A. How many...?

14 Q. Of this type of situation where an
15 individual user is selling electricity back to Ontario
16 Hydro?

17 A. It is not common to my knowledge.

18 Q. I think there is evidence in Panel 5
19 that said there was one situation.

20 A. That makes it not common.

21 Q. It certainly does.

22 Now I wanted to talk for a minute about
23 passive. You divided solar up into active and
24 passive -- no, I'm sorry. You said on the left-hand
25 side there is an active category and that's divided

1 into solar heating such as domestic hot water and
2 swimming pools.

3 A. Right.

4 Q. Now I suppose it's demand management
5 in a technical way, but I think we have all agreed --
6 or at least Hydro took the position that all
7 alternatives would be dealt with in this panel. So
8 that's why I am asking this question.

9 A. We dealt to a considerable extent
10 about solar water heaters in Panel 4.

11 Q. I will just ask you one question then
12 without repeating, and that is: Is it not true that it
13 is very likely in Ontario that every house will some
14 day in the near future have a solar water heater?

15 A. You are asking me whether it's true?

16 Q. Yes, whether you think it's true.

17 A. Not in my judgment, no. Not soon.

18 Q. Not in your judgment?

19 A. Not soon and not every household.
20 And we explained the reasons for that in Panel 4.

21 Q. Now you would agree that photovoltaic
22 and wind are very labour intensive in the production?
23 High tech --

24 A. I'm not sure.

25 Q. Well, it's a manufacturing sector

1 industry.

2 A. Yes, labour intensive compared to
3 what -- it takes labour to manufacture.

4 Q. It takes labour, all right.

5 And it certainly is more sustainable in
6 the long run because of the labour that it provides and
7 the energy being free, the fuel being free.

8 A. The fuel being free is certainly a
9 sustainable dimension, yes.

10 Q. And it also provides self-reliance to
11 those who want to use it?

12 A. Yes.

13 Q. Now Mr. Cuyler asked you some
14 questions about the cost, and I was surprised that you
15 didn't have any information on costs other than one
16 unit.

17 A. Costs of what?

18 Q. Costs of photovoltaic panels, costs
19 of those kinds of things. You indicated that your
20 evidence was based on a one-off purchase? That was the
21 evidence you gave Mr. Cuyler?

22 A. The costs for 1991 are based on our
23 recent experience, yes.

24 Q. Why would you not have reviewed the
25 literature of California Edison, for example, to see --

1 or phoned up somebody at California Edison and see what
2 their miles and miles or thousands of feet of
3 photovoltaics cost them?

4 A. Two things on that. We wanted to get
5 costs in Ontario in 1991. Secondly, I don't know
6 whether Southern California Edison has miles and miles.
7 I don't think that's true.

8 Q. Well, thousands of feet. I think I
9 exaggerated when I said miles and miles. Although I
10 understand Mr. Shepherd is down there right now, so we
11 might hear about it next week.

12 But there are a lot of applications in
13 the United States that are much further advanced than
14 here in Ontario?

15 A. Yes. And the intent, we captured
16 that literature and that projection in the year 2000
17 costs. We didn't think the American experience is
18 transferable to Ontario in 1991. We wanted to say,
19 here is a snapshot of what is happening in Ontario now.
20 Here is where we expect it to go. In projecting where
21 we expect it to go, we took into account the American
22 experience.

23 Q. But very conservatively, you would
24 agree?

25 A. No, I don't agree.

1 Q. The main use for photovoltaic, as you
2 envisioned it in your shopping centre, which is the 100
3 kilowatt or some commercial application and the 2
4 kilowatt residential is mostly load displacement; isn't
5 it?

6 A. Yes.

7 Q. Now why wouldn't Ontario Hydro set up
8 a photovoltaic division that had ongoing research, hard
9 research, not relying on other things, but doing its
10 own research and doing its own development and setting
11 up its own photovoltaic generation supply?

12 A. Well, I think photovoltaics is a much
13 bigger nut to crack than any one utility. It is common
14 now in areas like that to have various utilities
15 cooperate in consortiums or in research institutes that
16 get funded from various utilities and various
17 manufacturers. It isn't any more that one utility will
18 develop one technology or excel in one particular
19 conversion process. So, it is more common now for more
20 utilities to get together in demonstration projects and
21 research efforts. Different countries get together,
22 even; it is not a single-country effort any more.

23 Q. So what is a Ontario Hydro's
24 photovoltaic budget this year?

25 A. It is small. I have it in

1 interrogatories but it's a small number.

2 Q. Is it less than a million dollars?

3 A. Yes.

4 Q. Ontario Hydro does and has always
5 contributed to Atomic Energy of Canada Limited,
6 Canadian Nuclear Association?

7 A. Yes.

8 Q. That's right. And participated in
9 research for the CANDU reactor?

10 A. Yes.

11 Q. Put a lot of money into it?

12 A. Yes.

13 Q. Before it was ready to be used?

14 A. That's correct.

15 Most of the money that went at the
16 development stage, though, was not Ontario Hydro money;
17 it was government money.

18 If you go back to the 50s and 60s, before
19 commercialization, it was not Ontario Hydro's money, to
20 my understanding.

21 Q. But, as we will see in Panel 9, the
22 CANDU has changed quite a bit and Ontario Hydro has
23 certainly been a large contributor to those refinements
24 and changes in the CANDU. We are now up to CANDU 6.

25 A. I just want to draw the limitations

1 to putting money before the technology is in our system
2 and is generating electricity.

3 Q. I guess that's why I am asking you
4 why it isn't in your system.

5 A. Because of the reasons we have
6 mentioned. It is expensive and it generates
7 electricity for intermittent purposes, intermittent
8 periods.

9 Q. Maybe this isn't a question that
10 Ontario Hydro considers, but wouldn't it seem like a
11 logical time when factories are closing down that maybe
12 this would be a good way for Ontario to go, that
13 Ontario Hydro should look at photovoltaics? Build them
14 here in Ontario.

15 Q. What is the closing down refer to?

16 A. Well, the recession that we are
17 experiencing, the factory closings, the losses of jobs?

18 A. I think you are right. I don't think
19 it's an Ontario Hydro question to look at.

20 Q. Now talking about wind. Mr. Shalaby,
21 you were talking about wind last Tuesday, I think it
22 was. There is a very good strip of wind potential from
23 the northern tip of Lake Superior all the way down to
24 the end of Georgian Bay, thousands of miles; isn't that
25 right?

1 A. The preliminary maps show the coasts
2 of the Great Lakes to be a windy coast.

3 Q. And the wind meets the Ontario Hydro
4 criteria or the criteria that are set out in all the
5 books on wind, minimum wind speeds?

6 A. It is considered marginal from the
7 wind industry's point of view. We don't have criteria
8 really. We are not in the wind developing business.
9 But our knowledge of wind speeds is that the map that I
10 showed, showed the Great Lakes to be at 17-1/2 metres
11 per second -- kilometres per hour, sorry. And that is
12 considered marginal.

13 Q. Have you ever seen the wind operation
14 between Fresno and San Francisco in California?

15 A. Yes, I have.

16 Q. And their wind is no higher in that
17 area of the United States. It's hundreds of miles from
18 the shore, the coast --

19 [3:05 p.m.]

20 A. It is higher winds.

21 Q. Higher?

22 A. My understanding is it is higher.

23 Q. Have you got wind maps that show
24 that? Have you got a wind map of North America?

25 A. I know where to find one, but I don't

1 have it here.

2 Q. Maybe you could bring that data
3 forward. I would put to you that 17 kilometres an hour
4 is it not a marginal speed in today's wind technology.

5 I don't need that today. I think it is
6 just a difference of -- if you could perhaps provide us
7 with that data, where there is wind generation in North
8 America, what the wind speeds are, so that we can
9 compare that to what we have in Ontario. I think
10 that's the only way.

11 A. I think there is an exhibit. I was
12 looking at the exhibit number. Let me get the
13 exhibit number. Dynamo Genesis put an exhibit on wind.
14 I think in there, there are wind speed maps of
15 California.

16 Q. Where do you get the conclusion that
17 17.5 is marginal in your exhibits?

18 A. From the wind industry itself.

19 Q. Where is that in the exhibits? Have
20 you filed something that supports that?

21 A. If you look at that Dynamo exhibit
22 that I am looking for.

23 Q. What exhibit is that?

24 A. I am looking for it.

25 MR. HOWARD: 409.

1 MR. SHALABY: 409. 409 is a song; I
2 don't know whether it's an exhibit.

3 Yes, that's the one. Exhibit 409 is Wind
4 Energy Comes of Age by Paul Gipe. I think he explains
5 the wind developments in the California area and the
6 wind speeds in that area.

7 MR. GREENSPOON: Q. Maybe we can leave
8 that.

9 MR. SHALABY: A. You are generally
10 correct in that the wind industry is moving to harvest,
11 and I said that in my direct evidence, is moving to
12 harvest lower wind speeds. It becomes more expensive,
13 and they are not successful in that yet but they hope
14 to be.

15 Q. So you agree with me that we have a
16 very good potential source of wind along the Great
17 Lakes at 17.5 kilometres an hour?

18 A. I don't know if I agree. I don't
19 know. I am spending time to think to say that today's
20 wind technology would consider that a marginal
21 resource, to my knowledge that is it a marginal
22 resource. If tomorrow's machines that are variable
23 speed and can harvest lower wind speeds, perhaps that
24 would be a feasible resource.

25 Q. Part of the reason you are calling it

1 marginal is because of the cost?

2 A. That is right.

3 Q. Not that it doesn't produce
4 electricity.

5 A. It produces electricity. Marginal
6 refers to the cost.

7 Q. Marginal refers to the cost?

8 A. It does not refer to it will not turn
9 a turbine; it will turn a turbine.

10 Q. Before we move to the cost, I just
11 wanted to point out or ask you about that a lot of your
12 data is collected from weather data at airports?

13 A. Yes.

14 Q. Now, isn't it true that a priority,
15 my understanding is one of the priorities about
16 choosing a site for an airport is that it might not be
17 too windy?

18 A. Absolutely.

19 Q. So that might may not be the best
20 place to find good places for wind.

21 A. I indicated that this data is not
22 good data to base a wind prospecting on. I indicated
23 that clearly, that this data is airport data or weather
24 station data, and prospectors generally would go to a
25 site that they feel is windy and would monitor data

1 continuously for six months to a year, and they
2 generally monitor it at a height higher than what
3 airports would monitor it at, 30 metres height or 40
4 metres height.

5 Q. So without debating the wind speed,
6 there are a lot of places in Ontario, places around
7 Sudbury where we saw that donut-shaped circle--

8 A. Yes.

9 Q. --the Great Lakes, and these are
10 close to the grid?

11 A. I indicated that, that Sudbury is a
12 particularly good area.

13 Q. And these are places close to the
14 grid, not a lot of transmission involved. The grid
15 goes all along the Great Lakes?

16 A. Yes.

17 I am agreeing to Sudbury, I am not sure
18 about the Great Lakes, the wind speeds there.

19 Q. Now, let's just move back to, Mr.
20 Shalaby, if you look at page 7 on the update, Exhibit
21 452. I think this is a point that Mr. Cuyler made, or
22 at least started to make, and that is that talking
23 about rates, if we look at the lower band forecast
24 again, just to repeat, Hydro used to forecast at the
25 high band, now we are told we are supposed to

1 forecast -- we are supposed to look at the median band.
2 If we assume for a minute that really the lower band is
3 the one we should look at, just for argument's sake,
4 that's going to make the rates go up; isn't it?

5 A. Yes.

6 Q. If the rates go up, the renewables
7 become a lot more attractive?

8 A. To a farm owner or homeowner, yes.

9 Q. And to a non-utility generator?

10 A. Not necessarily, because that will
11 depend more on the purchase rates.

12 Q. Yes.

13 A. So by displacing his own load, he
14 will be displacing more expensive electricity.

15 Q. Yes, but the cost --

16 A. The same to the utility, that will
17 depend on avoided costs and other things.

18 Q. But the cost/benefit ratio and the
19 LUEC change to the advantage of the renewal?

20 A. Not necessarily, no.

21 Q. Well, they certainly become more
22 attractive than some of the major supply, don't they,
23 to Ontario Hydro?

24 A. If that scenario comes true, I don't
25 think any supply would be attractive to Ontario Hydro.

1 It would be surplus, so it's academic at that stage.

2 Q. Let's move over to page 22 for a
3 minute. In the middle of the page, after the bullets,
4 if the surplus were to materialize, do you see that?
5 If the surplus were to materialize, second sentence?

6 A. Page 22?

7 Q. Yes, after the bullets, the
8 paragraph.

9 A. Yes.

10 Q. If the surplus were to materialize
11 there would be adverse rate impacts for customers, that
12 means the rates would go up, as a result of paying for
13 the costs of NUGs and demand management that is not
14 required.

15 Well, isn't the reality that the rates
16 would go up because there is too much supply, major
17 supply? Too many nuclear plants? Isn't that really
18 why the rates would go up? You can't blame it on
19 non-utility generation and demand management that's not
20 required. Is Ontario Hydro saying that they only want
21 demand management if the load forecast is going to go
22 up? That doesn't seem to be Ontario Hydro's position.

23 A. I don't know if that is a subject for
24 this panel or you prefer to keep that until another
25 panel.

1 Q. Yes, I think it is important when you
2 talk about the alternatives and how you feel that
3 alternatives are not going to be competitive in the
4 future.

5 A. So the question you are asking is why
6 would rates go up?

7 Q. I am asking why you have attributed
8 rates going up to non-utility generation and demand
9 management as opposed to major supply?

10 A. I think all of those would contribute
11 to raising the rates.

12 The rates we charge to our customers are
13 the costs that we incur in a particular year and those
14 include non-utility generation, demand management,
15 depreciation for our existing plants, fuel bills,
16 salaries, everything. So all of those contribute to
17 the rate base in any one year.

18 Some of them you can change easier than
19 others. It's very difficult to change the depreciation
20 of an existing plant you already own. Other things you
21 may have more control over. So, perhaps that's the
22 reason they singled those out, perhaps there is more
23 control.

24 Q. There is some supply which is not yet
25 fired but built; isn't that true?

1 A. What do you have in mind for that
2 example?

3 Q. Don't we have a nuclear reactor
4 sitting there that hasn't been fueled yet?

5 A. Yes, some units are not, some are
6 fueled but still not working.

7 Q. Right. I guess that's why I raised
8 it.

9 What plant is that?

10 A. Plant D. It's Darlington.

11 Q. I just wanted to ask a question about
12 the objectivity versus the subjectivity of this word
13 alternatives. I put it to you that if we lived in a
14 province where wind and photovoltaics were the major
15 source of supply, then nuclear would be the
16 alternative, wouldn't it?

17 A. Yes.

18 Q. So it is just a subjective word?

19 A. Yes.

20 In fact, the Japanese always called
21 nuclear alternatives in the late 70s.

22 Some utilities call natural gas
23 alternative.

24 Alternative is something that you are not
25 doing today, that's all.

1 We are always at a loss of what to call a
2 collection of technologies that they are neither all
3 renewable, nor are they all small nor are they all
4 private. Whatever label you put on them will not
5 necessarily fit completely.

6 Q. But it is a subjective label; isn't
7 it?

8 A. Yes.

9 Q. So, fuel cells, I just wanted to ask
10 you one question about fuel cells. Fuel cells are not
11 renewable because they have to have a fuel?

12 A. Yes.

13 Q. But there is an application for fuel
14 cells that is renewable; isn't there, and that is, if
15 you use them as we said before, as we talked about in a
16 mix, if you used a fuel cell in combination with a
17 photovoltaic and the photovoltaic, when it had a
18 surplus could run an electrolysis of water and produce
19 hydrogen for the fuel cell. So you would have hydrogen
20 that you could use with the fuel cell on cloudy days.
21 Have you heard of that concept?

22 A. Yes.

23 Q. I am putting to you that that would
24 be a better use of fuel cells than to burn
25 non-renewables such as natural gas.

1 A. That's one view, yes.

2 Q. Is Ontario Hydro looking at that
3 possibility?

4 A. Not in detail, no.

5 Q. So Ontario Hydro isn't doing anything
6 about electrolysis technology?

7 A. Not a great deal, no. We looked at
8 it and produced reports on the subject in the early
9 80s, but to my knowledge we haven't been active in
10 that.

11 Q. Just a couple of areas that I wanted
12 to cover, biomass was one of them.

13 I wanted to clarify something about this
14 60 square kilometre area between Eglinton and Yonge and
15 the Humber River to the lake, was Ontario Hydro
16 proposing that we plow that up and plant willows or
17 that was just an example?

18 MR. DAWSON: A. That was just an example
19 to give you some idea of the area.

20 Q. I don't know what my client's
21 position would be on that.

22 MR. HOWARD: Probably a good idea.

23 MR. GREENSPOON: Yes, I agree. Mr.
24 Howard said it's probably a good idea.

25 Q. What I want to focus on, however, is

1 the other types of biomass. It's Northwatch's position
2 that harvesting is not the way to go with biomass, an
3 agricultural rotation type harvest. And I wanted to
4 know what Hydro has looked at in the area what we would
5 call a sustainable biomass, and that is where you go in
6 and harvest an existing forest in a sustainable way and
7 produce energy from that.

8 Now, maybe you could comment on that.

9 Does Hydro have any figures about the amount of
10 available biomass there is and how that can be
11 harvested so that the forest base is maintained?

12 MR. DAWSON: A. Yes, there are some
13 studies and there has been work done by Professor
14 Pfeiffer at Guelph, and I think they were provided as
15 responses to interrogatories to you. Those studies
16 looked at harvesting existing forest and selective
17 thinning of existing forest as ways to produce biomass.
18 The bottom line of that is that they produce wood fuel
19 at a higher cost than plantation wood fuel.

20 So that whichever way you go, it's
21 currently uneconomic relative to current cost --

22 Q. Well, I put to you it depends on how
23 costing and what you count, because you can't farm a
24 piece of land forever, can you, if you are harvesting
25 it? You have to use fertilizers?

1 A. That's right.

2 Q. Are you aware of the amount of wood
3 that's available from an acre, how much wood can be
4 harvested from an acre of land in an excess way that
5 has no impact on that forest?

6 A. There were some estimates in that
7 report by Professor Pfeiffer, I believe. He produced
8 estimates of the production rate per acre.

9 Q. Do you know how many btu's there are
10 if a cord of wood?

11 A. Not in a cord, no.

12 Q. A tonne?

13 A. I can tell you how many there in a
14 pound, though.

15 Q. A pound?

16 A. Roughly 5,000.

17 Q. 5,000 btu's in a pound?

18 A. That's, I think, in our alternative
19 energy report.

20 Q. What would you say to 250,000 btu's
21 in a cord?

22 A. I wouldn't have any idea. A cord is
23 what, eight feet by?

24 Q. Four feet.

25 A. By four feet?

1 Q. Yes.

2 A. If you can tell me how many pounds
3 that is I might have a clue.

4 Q. If you say there a 5,000 btu's in a
5 pound, if I say there is 250,000 btu's, that would seem
6 to me that would be about... I hate this math.

7 A. You tell me.

8 Q. We will leave that for another day.

9 In any event, I will put it to you it's
10 \$250,000 btu's to a cord of wood, and that you can get
11 10 cords of wood out of a piece of forest which will
12 have no impact on that forest. In fact, in 10 years
13 there will be more wood in that forest than there was
14 before you cut it.

15 A. Yes, it may be, but I think the cost
16 of producing that wood a higher than it is for the
17 plantation, and you get the same sort of answer.

18 In fact, the cost estimate that is
19 produce in our alternative energy report uses an
20 average cost of wood that includes selective forest
21 thinning, it includes clear cutting and it also
22 includes some plantation biomass, so it's an average of
23 those costs.

24 Q. So Hydro's position is there is no
25 way to cut wood and make electricity out of it?

1 A. I think you are still faced with the
2 same problems. You have got a low energy density fuel
3 that it dictates that you are going to build small
4 generation and it's not economically competitive with
5 large coal-fired generation.

6 Q. No. But think about the people in
7 Atikokan and Thunder Bay are getting 14,000 tonnes of
8 sulphur dioxide dumped on them every year. Maybe they
9 would rather have 1 and 2 megawatts plants that they
10 can cut the wood for and get some jobs and not have the
11 acid rain.

12 A. I don't have any comment to that.

13 Q. I want to move on to pyrolysis. Have
14 you got any technical data on pyrolysis?

15 A. No, I don't.

16 Q. Has Hydro looked at any studies of
17 pyrolysis?

18 A. We are aware of the fact that you can
19 pyrolyze wood, that's all that I am aware of.

20 Q. I wanted to move on to waste,
21 municipal waste, if you could pull E8 from your
22 overheads, Dr. Effer.

23 No, that's not the one I wanted.

24 You presented a table, Dr. Effer, of the
25 contents of landfill of waste in municipal landfills.

1 DR. EFFER: A. I believe so.

2 MR. HOWARD: I think it was Mr. Dawson.

3 MR. GREENSPOON: Oh, Mr. Dawson.

4 MR. DAWSON: Are you talking about the
5 chart that showed the variations of landfill gas over
6 time?

7 MR. GREENSPOON: Sorry, if I could just
8 have a moment, Mr. Chairman.

9 THE CHAIRMAN: Are you looking for a
10 table that shows solid waste?

11 MR. GREENSPOON: Yes, that's what I am
12 looking for.

13 THE CHAIRMAN: E9 is a summary form of
14 the various options.

15 MR. GREENSPOON: E9?

16 THE CHAIRMAN: E9, yes, it shows the
17 solid wastes produced by the various options.

18 MR. GREENSPOON: I think it might be in
19 the alternative energy review.

20 Yes. What I am looking for -- here is.

21 Q. Exhibit 344, page 153.

22 MR. DAWSON: A. Did you say 153?

23 Q. 153.

24 A. Right.

25 Q. Now, just looking at the far

1 right-hand column which is the Canadian national
2 average, and again given the state of landfills in
3 Ontario today, I think you would agree, Mr. Dawson,
4 that the future of landfills is not looking bright,
5 municipal landfills?

6 [3:25 p.m.]

7 A. It depends on whether you own one or
8 not. I think if you own one, it looks extremely
9 bright.

10 Q. But the chances of there being very
11 many more in the future are pretty slim?

12 A. I am not really in a position to
13 judge on that.

14 Q. Well, let's not debate that then.

15 In any case, looking at the materials in
16 a landfill site. Paper: 36.5 per cent. Is that
17 right?

18 A. That's what it says, yes.

19 Q. On the right-hand side.

20 A. Right.

21 Q. Most of that paper, if not all of it,
22 can be recycled; is that true?

23 A. I would suspect that it may be, yes.

24 Q. Food waste, yard waste, another 35
25 per cent, 33.8 per cent. That can all be composted; is

1 that not true?

2 A. I imagine the food waste can. I am
3 not too sure about the yard waste. It depends what's
4 in it.

5 Q. Assuming it's leaves and grass
6 cuttings --

7 A. If you assume it's --

8 A. Some of the yards around Toronto I
9 suppose it could be cars, but....

10 A. Yes.

11 Q. I think in its common form, yard
12 waste means leaves and clippings.

13 I wasn't referring to your car, Mr.
14 Shalaby. [Laughter]

15 MR. HOWARD: That's where it should be.
16 [Laughter]

17 MR. GREENSPOON: Q. Textiles and wood
18 can certainly be recycled as well?

19 Anyway, we have got the main components
20 there. We have dealt with the first three items and
21 almost 70 per cent, over 70 per cent of the waste is
22 gone from the landfill.

23 MR. DAWSON: A. That's nice in theory
24 but does it happen in practice? That's really what --

25 Q. Well, I put it to you that it

1 probably will; and if it doesn't, then I don't know
2 what we are all doing here. But the future of
3 landfills is not this way if we do what the government
4 is saying: 50 per cent reduction by the year 2000?

5 A. I don't think I have been advocating
6 landfill.

7 Q. All I am pointing out is that there
8 may not be any landfills to get electricity from in the
9 future.

10 A. I think we say in our evidence that
11 if municipal solid waste incineration and energy
12 recovery was to redevelop, then that would certainly
13 reduce the amount of landfill and the amount of
14 landfill gas that would be produced.

15 Q. I wasn't talking necessarily about
16 landfill gas. I was talking about--

17 A. You are talking about recycling --

18 Q. --incineration. I'm talking about
19 incineration.

20 A. You may be right, yes.

21 Q. I don't disagree with your figures on
22 landfill gas. I am taking issue with the figures on
23 incineration. I took Hydro's position to be that
24 incineration is something that could produce
25 electricity but is contrary to government relations?

1 A. We have agreed with that.

2 Q. One other issue that you raised, Dr.

3 Effer, and that is on page 19170. You are talking
4 about the impacts not related --

5 DR. EFFER: A. Excuse me for a moment.

6 Yes.

7 Q. 19170. The land use and aesthetic
8 concerns of renewables. Now, these aesthetic concerns
9 are of an order of magnitude 100 times less than the
10 environmental impacts of fossil. Would you not agree?

11 A. I think we would have to relate equal
12 energy output from that facility to compare the impact.

13 Q. But that is the only impact, is the
14 land use. If you compare the thousands and thousands
15 of tonnes of sulphur dioxide and all of the other
16 emissions plus the aesthetics of a fossil-fired plant,
17 this pales by comparison, doesn't it, even assuming
18 that people don't like the looks of windmills and
19 photovoltaic, which I am not sure that that is even a
20 fact?

21 A. I really can't predict what the
22 public will find objectionable in the years to come
23 with large-scale alternate energy use.

24 Q. No, but my point is when you take the
25 cumulative impacts of all of the environmental effects

1 of fossil fuel counting the emissions and the
2 aesthetics, the aesthetic impact that you talk about
3 here pales by comparison, does it not?

4 A. I think it is very difficult to
5 compare. You may be right, Mr. Greenspoon, in certain
6 areas; in other areas I wouldn't say it pales.

7 Q. There are people who find wind farms
8 and photovoltaic farms attractive?

9 A. I haven't met those people.

10 Q. Well, you are looking at one right
11 now.

12 A. I guess when you are asking I am
13 thinking of equivalent energy output and that's what I
14 am visualizing when you are asking that question.

15 Q. I will put it to you in an example.
16 I was able to drive from Fresno to San Francisco
17 through the California desert or through the hills of
18 California, where the windmills were, and I found it
19 very attractive, just the idea that the wind was
20 generating electricity. And I think there are other
21 people who feel that way. So I think that it is not
22 necessarily so, I put it to you, that the aesthetics of
23 wind generation are negative?

24 A. I have not made this a paramount
25 thing, aesthetics. I think you are correct in saying

1 that in some people's mind it is not as aesthetically
2 displeasing as seeing a smoke stack, for example, but
3 there are differences of opinion.

4 Q. We have already heard in evidence
5 that you don't take into account - we will find out I
6 guess in the next panel - the aesthetics of the 200
7 million tons of tailings in Elliot Lake from the
8 uranium mines or the oil and gas refineries or the coal
9 mines.

10 There was an area, Mr. Chairman, that Mr.
11 Howard -- and I just wish to raise because I am not
12 sure what to do this in area. Mr. Howard asked Dr.
13 Effer to relate the six alternative technologies to the
14 six main issues that he dealt with in the fossil panel.

15 I want to relate the six alternative
16 technologies to nuclear power and I don't think it is
17 appropriate to do that in this panel, but given that
18 Mr. Howard did it with fossil, I think that I should be
19 given the opportunity to -- and maybe Mr. Shalaby is
20 going to be in Panel 9 and it presents no problem, or
21 Dr. Effer. I think he indicated there was going to be
22 somebody from his division on Panel 9. I am just
23 wondering if there is somebody from the alternatives
24 division.

25 Because I think it is clear from the

1 transcript that Dr. Effer went through about a ten-page
2 comparison of fossil to alternatives, and I certainly
3 found the connection between fossil and alternatives to
4 be somewhat arbitrary, especially when it deals with
5 the renewables, and I think we should be given the
6 opportunity of comparing alternatives to nuclear.

7 THE CHAIRMAN: Well, I don't disagree
8 with that. I think that's a perfectly legitimate issue
9 that has to be dealt with at some point. I don't know
10 whether anyone on this panel can be of much help to
11 you. That's the only --

12 MR. GREENSPOON: No, I don't propose and
13 I think it is inappropriate but I want to raise it.

14 I didn't object at the time to Mr. Howard
15 asking those questions, but I want it to be clear that
16 I expect to be able to ask those questions.

17 MR. HOWARD: I'll take that as a notice
18 of questions.

19 THE CHAIRMAN: I don't know when it will
20 occur. I mean it's perfectly legitimate to compare
21 options between technologies, and that's one of the
22 things that we are going to have to do.

23 MR. HOWARD: Yes, as I understand it, Mr.
24 Chairman, there will be somebody to speak to
25 environmental issues in the nuclear panel; and if that

1 person can read the evidence, what he is talking about
2 as to the assessment made by the alternatives by Mr.
3 Shalaby and Mr. Dawson, then we will have somebody who
4 can answer the question. That means if Dr. Effer has
5 to come back from his retirement, he will be here for
6 that.

7 THE CHAIRMAN: I think the two of you can
8 marry them together and you can see the environmental
9 effects.

10 MR. HOWARD: I am sure we can be prepared
11 to answer those questions and I will pass that on to
12 the counsel in charge of Panel 9, for which he won't
13 thank me, but....

14 MR. GREENSPOON: I agree with what Mr.
15 Howard says that Dr. Effer would be the best person to
16 do that, given that it's his six or eight pages of
17 evidence.

18 MR. HOWARD: Just a minute. I didn't
19 undertake to have Dr. Effer. The alternative energies,
20 the six alternative energy options which were examined
21 in this panel, we stuck it here because we didn't know
22 where else to put it. But the facts with respect to
23 their environmental characteristics will be familiar to
24 whoever is going to speak to the environment and
25 nuclear, and he can do the same comparison as Dr. Effer

1 did for fossil.

2 MR. GREENSPOON: It sounds reasonable to
3 me.

4 THE CHAIRMAN: All right. Thanks, Mr.
5 Greenspoon.

6 MR. GREENSPOON: That's a good time to
7 stop. Thank you, that's all the questions I have.

8 DR. CONNELL: Dr. Effer, when you were
9 discussing with Mr. Greenspoon the impact of
10 atmospheric SO(2), Mr. Greenspoon implied that the
11 damage to the environment in the Sudbury area could be
12 attributed to acid rain, at least that was the
13 inference I drew from his comment.

14 Are you aware that deposition of toxic
15 substances in the soil is also a factor which has
16 interfered with growth or vegetation in that area?

17 DR. EFFER: Yes, I am aware of the
18 research carried out on the deposition of heavy metals.
19 It was conducted at the University of Toronto, for
20 example.

21 DR. CONNELL: Are you aware which is the
22 most significant factor as between acid rain and toxic
23 deposition?

24 DR. EFFER: I would say in the near field
25 probably - this is somewhat of a guess - I would think

1 within the first 4 or 5 miles, the outfall of heavy
2 metals probably results in a dominant effect, whereas
3 that with the high stack is in an area which is, from
4 the point of view of gaseous emissions, is somewhat of
5 a shadow. The main sulphur dioxide emissions don't
6 come to ground until after that. So, it is a guess
7 really but I would say that would be the case.

8 DR. CONNELL: Thank you.

9 THE CHAIRMAN: Any further questions?

10 MR. GREENSPOON: Yes.

11 Q. Do you know when the high stack was
12 built?

13 DR. EFFER: A. 12 years ago.

14 Q. 12 years ago. And are you aware that
15 in the first 20 or 30 years, back around the turn of
16 the century, there were no stacks; they did all the
17 smelting right on the ground?

18 A. I have seen those transparencies --

19 Q. And that's when most of the trees,
20 the big trees were killed?

21 A. That is because there was no stack,
22 that the sulphur dioxide rolled across the ground.

23 Q. Right. So it is clear that it was
24 the sulphur dioxide that killed the trees, not the
25 heavy metals. The heavy metals are probably

1 preventing anything from growing there now.

2 A. I made the point that I thought that
3 the sulphur dioxide contributed more to adverse effect
4 on vegetation in the fields a little further away from
5 the old stacks or the existing stacks.

6 Q. Right. Thank you.

7 A. I wasn't questioning the effects of
8 the stack on acids deposition.

9 MR. SHALABY: A. To give a link to this.
10 People are saying this is the reason the winds are a
11 good regime in the Sudbury area: There are no trees.
12 That is a fact. The reason the winds are good in
13 Sudbury is also lack of vegetation.

14 MR. GREENSPOON: Being born in Sudbury, I
15 feel like I should defend that but I won't.

16 THE CHAIRMAN: Mr. Campbell, you will be
17 next. We will take a short break. We have to stop
18 today just a few minutes before five.

19 MR. M. CAMPBELL: Thank you, sir.

20 THE REGISTRAR: Please come to order.

21 This hearing will take a 15-minute recess.

22 ---Recess at 3:40 p.m.

23 ---On resuming at 3:55 p.m.

24 THE REGISTRAR: This hearing is again in
25 session. Please be seated.

1 THE CHAIRMAN: Mr. Starkman.

2 MR. STARKMAN: Mr. Chairman, just prior
3 to Mr. Campbell starting, I wanted to prefile a
4 document with the panel. It's entitled "Initial Review
5 of Ontario Hydro's Demand/Supply Plan Update". This is
6 not a document that we will be referring to in our
7 cross-examination of Panel 8, but we will probably be
8 referring to it for Panel 9, 10 and perhaps other
9 purposes.

10 THE CHAIRMAN: May we give that an
11 exhibit number, please.

12 THE REGISTRAR: That will be 483, Mr.
13 Chairman.

14 ---EXHIBIT NO. 483: Document entitled "Initial Review
15 of Ontario Hydro's Demand/Supply
 Plan Update".

16 THE CHAIRMAN: Mr. Campbell.

17 MR. M. CAMPBELL: Thank you, sir. I
18 intend to focus primarily on Exhibit 468, the health
19 effects component of that exhibit, but I also have one
20 or two questions on Exhibit 344, alternative energy and
21 on 452, the Update.

22 I would like to introduce two exhibits.
23 The first is an extract from the United Nations
24 Scientific Committee on the effects of atomic
25 radiation. It is a 1988 report to the General

1 Assembly. I have given copies of this extract to my
2 friend Mr. Howard, and I believe the panel is aware of
3 it. And I would like to have that entered as Exhibit
4 484.

5 ---EXHIBIT NO. 484: Extract from the report of the
6 United Nations Scientific
7 Committee on the effects of atomic
8 radiation, dated 1988.

9 MR. M. CAMPBELL: And the second exhibit
10 is an extract from the Porter Commission, the Royal
11 Commission on Electric Power Planning. That is a
12 document that is dated February 1980, and I have three
13 pages which I think might be of some use. I have also
14 given copies to the panel. That should be Exhibit 485.

15 ---EXHIBIT NO. 485: Three-page extract from the Porter
16 Commission, the Royal Commission
17 on Electric Power Planning, dated
18 February 1980.

19 CROSS-EXAMINATION BY MR. M. CAMPBELL:

20 Q. I believe, Dr. Effer, was the witness
21 who spoke about Exhibit 468, and I would like to
22 address my first question to him. I wonder if he can
23 tell me something of his qualifications to deal with
24 health effects of fossil generation. I note from your
25 CV, Dr. Effer, that you are primarily a chemist. You
 have your Ph.D. in plant biochemistry. I wonder if you
 can tell us something of how that relates to the health

1 effects of fossil generation.

DR. EFFER: A. With specific mention of
Exhibit 468, I was manager of the department that
provided most of the effort that went into the
preparation of that report, the assembly of
information. That report did go after completion for
review to a group of people, including people from our
health and safety department. I have no specific
qualifications regarding health effects.

10 Q. Did you contribute to those,
11 particularly section 6, chapter 6 of this report, which
12 deals with impact on human health?

13 A. As I said, I was the manager of the
14 department and reviewed that section before it was
15 issued.

16 Q. But you did not draft it yourself, I
17 take it?

18 A. No, I did not.

19 Q. I think perhaps the simplest way to
20 deal with Exhibit 468 is to try to go through it. I
21 intend to limit my remarks to a few of the highlights.

22 I wonder if we could turn, Dr. Effer, to
23 page 1, section 1, Introduction. The very first
24 paragraph speaks of some benefits being easy to
25 quantify and some limitations to the quantification of

1 certain hazards and so on.

2 Would you agree with me that some health
3 costs could be quantified; for example, hospital
4 admissions, visits to doctors, and that sort of thing
5 could be the subject of quantification?

6 A. Yes, I agree.

7 Q. Could they also be costed? In other
8 words, put in dollar terms?

9 A. Yes.

10 Q. On page 1, again the second
11 paragraph, it says:

12 Decision makers must understand both
13 the benefits and hazards associated with
14 broad electricity planning choices in
15 specific facilities. As well, they
16 should be aware of the potential
17 environmental and health effects during
18 construction operations... and so on.

19 I wonder what weight should be given to
20 health effects in planning? Where should it rank in
21 terms of priorities in your view?

22 A. I think it is one of several factors
23 which are brought along in parallel. And when
24 decisions are made, the health effects of a facility is
25 one of many items which will be brought to bear on the

1 final decision. I can't say anything about the
2 priority of it relative to other factors that are
3 needed to make the final decisions.

4 Q. Would the quantification of health
5 impacts, including the costing of health impacts, be of
6 value to planners in understanding benefits and
7 hazards?

8 A. Yes, I think so.

9 Q. Does Hydro have any estimate of the
10 costs of the health impacts which are referred to in
11 this exhibit?

12 A. We have done estimates of health
13 effects and the costs of health and environmental
14 effects for the National Energy Board hearings for
15 example.

16 Q. Do you have them for costs of say
17 hospitals visits or hospital admissions? Do you have
18 that sort of data?

19 A. I am not overly familiar with the NEB
20 presentations.

21 Q. Let me go down to the very last
22 paragraph on page 1, and this lists health impacts
23 associated with fossil generation. Is this a complete
24 list.

25 A. I would say that the list in there

1 could be considered a fairly good representation.

2 There are other areas where, for example, emissions to
3 water would be one which one might consider adding.

4 [4:00 p.m.]

5 Q. Can you tell me perhaps what level of
6 confidence do you have that the health impacts are
7 accurately and comprehensively set out in this report?
8 Are they underestimated, are they overestimated? Do
9 you have any way of giving us your estimate as to the
10 confidence level we can have in this document?

11 A. I'm sorry, in relationship to what?

12 Q. How accurate is this likely to be?

13 A. We have followed a procedure which is
14 an accepted method of arriving at health risk
15 assessments and come up with answers which relate to
16 health risks which are or are not acceptable, and our
17 calculation show that they fall within the area of
18 acceptability for normal risks.

19 Q. Are you erring on the side of
20 underestimating or overestimating health impacts?

21 Could you help me with that?

22 A. We have concentrated here on the
23 health impacts of primarily on the effect of air
24 toxics, and in that sense we have made the statement,
25 which I think is accepted by others, that that is the

1 primary pathway of leading to health effects in the
2 sense that the calculations that we have made, we
3 believe that many of the assumptions we have made to
4 arrive at our figures on risk have got a number of very
5 conservative elements in it.

6 Q. Can we turnover to page 3, please.

7 This is under section 2, the fossil generation system.
8 In particular I am interested in the last three
9 paragraphs on page 3, and in particular the issue of
10 how this document is affected by Exhibit 452 and the
11 Update.

12 I take it this document was prepared in
13 January 1992. Was it prepared in conjunction with
14 Exhibit 452, the Update, or was it prepared prior to
15 that?

16 A. It went on in parallel, Mr. Campbell.

17 Q. Is the primary thrust of this
18 document though the existing system or the
19 Demand/Supply Plan?

20 A. You are referring to 468 now?

21 Q. 468, yes.

22 A. We have used an existing plant as an
23 example or model of a process or procedure which can be
24 readily applied to other facilities.

25 Q. I would like to skip over to page 27

1 of the exhibit, please, Exhibit 468, and examine the
2 two figures which appear. I take it figure 3.12 and
3 figure 3.13, it would be possible to relate emissions
4 to electric production at each of the several sites
5 mentioned; is that correct?

6 A. Yes, I think in the lower part of
7 that 3.12, that is what you have. You have got
8 emissions related in terms of grams per kilowatthour.

9 Q. I see. And is there any inherent
10 difference between the several sites? For example,
11 Lakeview, with respect to sulphur dioxide emits 8.8
12 grams per kilowatthour, but Thunder Bay emits 3.5.
13 What sorts of things go into the difference?

14 A. It's two things. One is the sulphur
15 content of the fuel and the other one is the plant
16 efficiency.

17 Q. I see. Are these emissions then
18 calculated on an annual basis or --

19 THE CHAIRMAN: Just a moment, I don't
20 quite understand. I thought Mr. Dawson said that the
21 plant efficiencies were all roughly the same.

22 DR. EFFER: I think I meant thermal
23 efficiency, Mr. Chairman.

24 THE CHAIRMAN: What do you mean by plant
25 efficiency?

1 DR. EFFER: I mean that more emissions,
2 at lower plant efficiencies more emissions are emitted
3 per kilowatthour produced, the conversion of the fuel
4 to energy.

5 THE CHAIRMAN: But the heat content of
6 the coal in Thunder Bay is quite a bit less than
7 Lakeview, so you would have to burn more coal at
8 Thunder Bay; is that right?

9 MR. DAWSON: That's right, you burn more
10 coal, more tonnes of coal per kilowatthour generated
11 because the heat content is lower. But on top of that,
12 the thermal efficiency of the Thunder Bay station would
13 be lower than Lambton, for example, because it operates
14 at lower steam pressures. Therefore, again, the
15 emissions per kilowatthour generated would tend to be
16 higher because of that too, you would burn more coal
17 again because the thermal efficiency is somewhat lower.

18 THE CHAIRMAN: So the emission per
19 kilowatt would be higher at Lakeview; is that right?
20 Am I reading that correctly?

21 MR. DAWSON: Yes, the emissions per
22 kilowatt are a higher at Lakeview in terms of SO(2)
23 because the sulphur content of the coal in 1990 was
24 higher at Lakeview than it is at Thunder Bay.

25 MR. BURPEE: If you want to compare

1 Thunder Bay and Lakeview, which I have been at both
2 stations, both at full load burn about 100 metric
3 tonnes of coal an hour, but the sulphur content at
4 Thunder Bay is about 0.4 per cent and it's 1.4 at
5 Lakeview, so that's what giving most of the difference.

6 THE CHAIRMAN: My question just arose out
7 of the fact that Dr. Effer said there were two things,
8 one sulphur content and the other plant efficiency, and
9 that's where I got confused a bit.

10 MR. BURPEE: The efficiencies are, as Mr.
11 Dawson said, around 35 per cent, but there is slight
12 variation. I think Lakeview might be down at 33-1/2
13 per cent. So they are ballpark, they are the same, but
14 when you are actually looking at emissions and or even
15 dispatch order, a slight difference will make a
16 difference in the running.

17 MR. M. CAMPBELL: Q. The narrow point
18 that I wanted to make was that one could compare
19 emission factors from plant to plant and can perhaps
20 explain the differences. That's the sole point I wish
21 to make.

22 I would like to compare figure 3.12 and
23 figure 3.13 to the figures over -- I believe it's page
24 30, figure 3.16 which deals with trace elements
25 emissions, and I think the same can apply to figure

1 3.17 on page 32 which is trace organic compounds. Can
2 these emissions also be listed on a plant by plant
3 basis?

4 DR. EFFER: A. They could be. This is a
5 representation of the first option which is U.S.
6 bituminous coal, and for the other plants burning other
7 than that there would be different emission rates for
8 trace elements, depending on the type of coal.

9 Q. But what would be the use of relating
10 the emissions listed here to emissions on a plant by
11 plant basis? I take it they would be used to do that,
12 would they? Compare the efficiencies of the various
13 plants with respect to these compounds; is that
14 correct?

15 A. I'm sorry, could you rephrase it?

16 Q. Could the trace element emission
17 estimates listed at 316 and the trace organic estimates
18 listed at page 317 be related to the several plants
19 that you have in operation?

20 A. To some degree. They would be
21 slightly different again depending on the type of fuel
22 to be burned.

23 Q. Would this be a useful exercise for
24 the purpose of assessing health impacts?

25 A. There are measurable differences in

1 trace elements between coals, and for the purpose, for .
2 this exercise I think the benefit will be marginal.

3 Q. One could look at the emissions which
4 are emitted at a particular plant and compare to
5 emissions elsewhere and one could look at the
6 populations around those plants and get a better
7 projection --

8 A. Yes, you would get a more detailed
9 assessment.

10 Q. But you say that would be of marginal
11 value. Can you tell me why you think that would be of
12 marginal value?

13 A. Well, I am saying that if we come to
14 the end product and look at the final result that we
15 have of trace element effects on health, I think we
16 could accommodate fairly substantial differences
17 between plants and - again, I am guessing here - not
18 arrive at too much of a difference in the final health
19 risk assessment.

20 Q. You say guess, you mean an educated
21 guess?

22 A. It's an educated guess, yes.

23 Q. On page 33 under the heading DSP
24 Option Air Emission Estimates there is reference to
25 assumptions about controls and their efficiencies, and

1 then following that there are three bullet points that
2 set out these assumptions. On what basis were these
3 assumptions made?

4 A. These are figures that are
5 established or put down in the Demand/Supply Update.

6 Q. Where did that come from?

7 Are these industry standards? I just
8 don't know where these numbers came from.

9 MR. MEEHAN: A. I think these are the
10 standards that we would be designing to for new
11 facilities. We would do that or better in our designs.

12 Q. And the technology is available to --

13 A. The technology is available, yes.

14 Q. Is that the best available technology
15 or how would one define that technology?

16 A. Certainly the SCR is the best
17 technology for NOx removal, or at least it's the
18 highest removal rate. I think Mr. Dawson would testify
19 that -- did you want to do this, Mr. Dawson?

20 MR. DAWSON: A. Carry on. You're doing
21 fine.

22 MR. MEEHAN: A. I think we expect a
23 higher than 90 per cent removal from the scrubbers, the
24 SO(2).

25 Q. These technologies are being

1 considered, I would take it, for the life extension of
2 existing plants; is that correct?

3 A. Yes, that would apply as well there.

4 Q. I take it these technologies are not
5 now in place; is that correct?

6 A. We have the high-efficiency
7 electrostatic precipitators, the two units that were
8 rehabilitated at Lakeview have those high-efficiency
9 precipitators, and the next two that are being
10 rehabilitated will also have high-efficiency
11 precipitators. I think they are in place at Atikokan
12 and at Thunder Bay.

13 Q. Does equipment of this sort or
14 technology of this sort lose its efficiency over a
15 period of time, so that if you extend the life of
16 plants will you find that the rate of removal of SO(2)
17 or the rate of removal of nitrous oxide will be
18 reduced?

19 MR. DAWSON: A. Not necessarily, if it's
20 maintained properly it should not lose efficiency.
21 Though I will admit that our precipitators on Lambton
22 and Nanticoke, perhaps the efficiency has tended to
23 deteriorate, but that's been to some degree because we
24 have been burning lower sulphur coals, and we have
25 restored the efficiency to some degree by adding flue

1 gas conditioning on those units to improve the ash
2 resistivity and that has improved the collection
3 efficiency on the precipitators.

4 We have got precipitators on all those
5 units and they are getting of the order of 99 per cent
6 removal at Lambton, Nanticoke and a balance of the
7 units at Lakeview.

8 Q. I would like to turn to page 39 where
9 scrubber waste by-product utilization options are set
10 out, and in particular I would like to ask about
11 gasifier slag which is described in this report as
12 being inert, non-porous, and pervious to leaching. I
13 ask you to look at Exhibit 484, the sources, effects
14 and risks of ionization radiation, the UNSCEAR
15 document, and in particular at paragraph 182 at the
16 bottom of page 82, and also on the page of next page,
17 page 183. I believe you have had a chance to look at
18 this.

19 My particular question is: In the face
20 of the comment from UNSCEAR, is it your position that
21 there are no natural radionuclide concentrations in the
22 slag from coal-fired power stations? In your
23 estimation does this not pose a risk?

24 A. I think whatever concentration
25 mechanism occurs within conventional steam cycle plants

1 in the flyash would presumably also apply to gasifier
2 slag.

3 I think the only point we were making
4 about gasifier slag is that it is a glassy material,
5 it's a glassy frit, and as such it's much less
6 susceptible to leaching than conventional flyash is,
7 and therefore from that point it's lot better and in
8 fact would perform much better in terms of the MOE
9 standard leaching characterization.

10 Q. You refer to the California State
11 Department of Health, determining solidified slag
12 particles as non-hazardous and considered
13 environmentally benign for disposal may be sold for
14 commercial purposes such as road building, insulation
15 and abrasive.

16 I just wonder if that statement stands in
17 light of the UNSCEAR report? Can you comment on what
18 to me is a potential contradiction?

19 A. I am not sure what these radiation
20 levels represent in terms of a health hazard so I can't
21 really speak to that. But there are locations all over
22 the world where flyash is being used as a road fill
23 material without any obvious health effects that I am
24 aware of, anyway. But I can't really speak to this
25 radiation issue that you have raised in paragraph 182,

1 other than I would tend to agree that the
2 concentrations of radioactive materials will tend to
3 concentrate into the ash as you burn the coal off. I
4 think that's fairly obvious.

5 Q. If we look at page 41 under
6 decommissioning you will note that you refer to the
7 disposal, recycling or reuse of waste material. Would
8 this include waste material which falls within the
9 materials which UNSCEAR has listed? The flyash and
10 slag?

11 A. I am sorry, I missed your question.

12 Q. The waste material which is referred
13 on page 41 under the heading Decommissioning, would
14 that include flyash and slag?

15 A. Would the decommissioning include?

16 Q. Would the waste material listed on
17 page 41 under the heading Decommissioning...

18 A. Under decommissioning, no. You would
19 have already disposed of the flyash and slag. That
20 would be either landfilled or have been recycled.

21 I think the waste material that is being
22 referred to there would be things like the concrete and
23 the waste material from the building structure.

24 Q. So that would not include flyash and
25 slag?

1 A. I don't believe so, no.

2 Q. I would like to move over to, I
3 believe it's chapter 4.3, page 44 and 45. In
4 particular, I draw your attention to section 4.3.1, the
5 overview, where it says: Humans are exposed to a
6 variety of environmental contaminants in air, water
7 soil and food. I take it this would include the
8 emissions produced by Hydro from time to time as a
9 result of its operations; is that correct?

10 DR. EFFER: A. Yes.

11 Q. The next sentence refers to any
12 contaminant in high concentrations can cause damage if
13 exposure to a cell occurs. And I believe that there is
14 a slight typo here. Do you mean to say, and if
15 accumulative this cellular damage can result in disease
16 or death?

17 A. Take out "the", yes.

18 Q. Do you have a list of particular
19 diseases or particular causes of death which you would
20 focus on in terms of relating the particular
21 contaminants emitted by Hydro?

22 A. In this report we have talked about
23 non-carcinogenic and carcinogenic effects, and have
24 mentioned under the non-carcinogenic respiratory,
25 various respiratory problems; we have not defined

1 specific carcinogenic effects.

2 Q. I didn't quite hear you?

3 A. We have not gone into anymore detail
4 other than saying carcinogenic effects. We have not
5 amplified that and talked about specific cancers,
6 specific types of cancer.

7 Q. There are also non-carcinogenic
8 effects, are there not?

9 A. Yes.

10 Q. Respiratory and other --

11 A. Yes.

12 Q. At the top of page 45 you list five
13 fundamental components of health effects required in
14 assessing health effects. I wonder if you would also
15 add to those five the numbers of people exposed to
16 contaminants, the numbers of people who are
17 particularly vulnerable such as those who may be
18 elderly or the very young or the unborn child, and so
19 on.

20 [4:25 p.m.]

21 Would that also be a component which one
22 would want to take into account in assessing health
23 effects?

24 A. Yes, we were being general here. I
25 think those additions that you suggested are contained

1 in 3, the exposure of humans to pollutants. I think
2 there we have implied that different humans get
3 different exposures. And of course that also includes
4 populations.

5 And in 4, the dose received also is a
6 factor influenced by the type of human's age group and
7 their existing health condition.

8 Q. Would that also include the
9 monitoring of population trends in shifts over time?

10 A. We have not gone into that level of
11 detail in this study. We have assumed a stable -- for
12 this study, we have assumed a stable population. I
13 took one specific point in time.

14 Q. Even though the plan itself runs for
15 25 years at this stage, you have assumed for your
16 baseline the one year; is that correct?

17 A. Yes. For most of the study we have
18 assumed one year's data which includes population in
19 the grid.

20 Q. I would like to ask you at page 47
21 about your health risk studies and in particular the
22 two regional scale assessments and the local scale --
23 I'm sorry, the regional scale risk assessment and the
24 local scale risk assessment. These are based on
25 existing plant, is that correct, and study of the

1 existing population in the areas of the study; is that
2 correct?

3 A. Yes. The first one, the regional
4 scale, looked at existing plants and are local scale;
5 No. 2 was for purpose of demonstration, it was one
6 plant.

7 Q. Is there any particular reason for
8 the choice of area to be covered in the study; for
9 example, under the regional scale, we have an area of
10 120 kilometres by 120 kilometres; for local we have 41
11 kilometres by 41 kilometres. Is there any particular
12 reason for that?

13 A. I am not aware of the reason for the
14 larger area done in the regional scale. However, in
15 the local scale one, we tend to believe that the
16 smaller scale -- beyond that area, the health risks
17 fall off extremely rapidly and don't add materially to
18 the assessment.

19 Q. And were you examining a particular
20 group of diseases or causes of death in these studies
21 and can you tell me what those were?

22 A. No, we have not looked at any
23 specific existing diseases in the area. We are
24 treating this in a study which relates air emissions to
25 that existing population, not knowing the existing

1 state.

2 Q. And does that not give you -- the
3 absence of a focus study, looking perhaps at various
4 types of cancers or various types of respiratory
5 diseases, do you find that detracts from the accuracy
6 of the study? Do you have any comment on that
7 methodology?

8 A. I think our study is intended -- the
9 local scale, which is the one in this report, really
10 focuses on the incremental effects of the emissions,
11 both onto individuals and populations in the area.

12 Q. But you can't be more specific about
13 what those incremental effects are?

14 A. I can't be specific about effects. I
15 can only talk about the incremental risks.

16 Q. Well, let's look at incremental risks
17 then or the risk characterization procedure at section
18 4.3.3. And you have set out a unit risk factor, which
19 is defined, and you have also set out a maximum
20 individual risk factor which is defined, and also total
21 population risk. But these relate entirely to cancers;
22 is that correct?

23 A. Yes, that's correct.

24 Q. Do you have comparable risk
25 characterization procedure for non-cancers?

1 A. No, we don't.

2 Q. Why not?

3 A. I can only talk to the limitations of
4 this study which was confined to cancer assessments.

5 Q. So that we have no risk
6 characterization for procedure for non-cancers?

7 A. In this report, we have effects of
8 sulphur dioxide and nitrogen oxides on non-carcinogenic
9 effects on the populations.

10 Q. Now let's refer for a moment to the
11 wording under "Maximum Individual Risk", about four or
12 five lines up from the bottom -- sorry two, three lines
13 up from the bottom. Can you tell me what the words
14 "will develop cancer" means in connection with this?
15 What does that mean?

16 A. That is the mathematical calculation
17 which follows these prescribed procedures which will
18 produce this kind of numerical answer. And as we have
19 stated in the report, this is not an expression of
20 actual cancer, actual increases in cancer rates.

21 Q. But could you be more precise with
22 what those words mean, "will develop cancer"? Does it
23 mean that the cancer becomes apparent or does it mean
24 that someone develops a propensity for cancer? Cancer
25 may take 20 years to manifest itself. Can you be more

1 precise on that?

2 A. I am not familiar with the criteria
3 which is used by the U.S. EPA and the U.S. National
4 Academy of Sciences that form a basis for these risk
5 assessments.

6 Q. Can I ask you to turn to page 50,
7 Figure 4.3, unit risk factors. Can you explain to me
8 with reference to the dioxins and furans what the unit
9 risk factor is there. Can you just read that out to me
10 in laymen's terms.

11 A. That is 3.8 and the E plus 1 means
12 that it is just 3.8, instead of, for example, the one
13 above it is 1.7 times 10 to the minus 3; that's 1.7 in
14 a thousand; the dioxins and furans means that it is 3.8
15 times 10 to the 1, which is.... So that is 38.

16 Q. Is that an unusually high risk
17 factor? I just find it -- it sort of leaps off the
18 page.

19 A. I'm sorry?

20 Q. It leaps off the page, I gather. It
21 is quite a high concentration.

22 A. It is a measurement which is arrived
23 at by the Californian Air Pollution Control Officers'
24 Association and the U.S. EPA, which assesses the toxic
25 potential of these materials, and dioxins and furans

1 are highly toxic.

2 Q. And to what extent are the dioxins
3 and furans destroyed in the combustion of fossil fuels
4 in your various plants?

5 A. The temperature of combustion is such
6 that they are largely destroyed.

7 Q. Do the high temperatures occur when
8 the plant is started up? And are there unusually high
9 releases of dioxins and furans at the start-up phase?

10 A. I have no information on that.

11 Q. I take it that the fossil fuel is
12 used primarily for peak energy load; is that correct?

13 THE CHAIRMAN: I'm sorry. I didn't get
14 that question.

15 MR. M. CAMPBELL: Q. Fossil fuel plants
16 are used primarily or largely for the production of
17 energy at peak periods of use; is that correct?

18 THE CHAIRMAN: That has not been the
19 evidence.

20 MR. M. CAMPBELL: I'm sorry.

21 MR. DAWSON: No, they are used for
22 intermediate and maybe to some degree base load as well
23 as some peaking time.

24 MR. M. CAMPBELL: I'm sorry, I did not
25 mean to confuse.

1 Q. How frequently is the starting up,
2 the shutting down and the starting up of these plants?

3 MR. DAWSON: A. Maybe Mr. Burpee could
4 talk to that better than I could.

5 MR. BURPEE: A. Lakeview, which would
6 have probably the most frequent starts and stops, I am
7 just trying to recollect how many a year. Just a
8 second, I am just trying to figure out....

9 Across the station, eight units, there
10 might be in the neighbourhood of three, four hundred
11 starts in a year.

12 Q. At the time during the time that the
13 plant is started, the three or four hundred times per
14 year, the temperatures would be lower, would they not?

15 A. When they are first fired off, they
16 are lit off with ignition oil; and until you have a
17 steam flow through the re-heater, just after you go on
18 the line, you are limited by the temperature.

19 Q. And would the dioxins and furans be
20 destroyed at that point and would the release -- at a
21 greater number than usual?

22 A. That I have no idea.

23 DR. EFFER: A. If I may, Mr. Campbell, I
24 can refer you to page 31 of this exhibit, in which we
25 discuss the emission rates of some materials, organic

1 materials, in relationship to start-up and temporary
2 start-up conditions. And we have indicated there that
3 there is a wide variation in the emission rates
4 depending on at what stage the unit is at.

5 At full capacity - and I am assuming here
6 that these two are representative of other organic
7 compounds - but the cold start produces much higher
8 amounts than full capacity, but at intermediate levels
9 there can be quite variable results.

10 Q. I haven't noted for you, but we can
11 perhaps discuss it now. Three paragraphs up on page 31
12 from the bottom, the line which begins:

13 "However, when the temperature is
14 above 900 degrees Celsius, the dioxins
15 and furans rapidly decompose into other
16 compounds."

17 And then you go on to state that since
18 the boilers normally operate at a temperature range of
19 1,370 to 1650 degrees Celsius, they are not significant
20 sources of dioxins.

21 And my question is the extent to which
22 you might have emissions of dioxins and furans during
23 the start-up phase when the temperatures have not been
24 reached.

25 A. Yes, the table on that page shows

1 that.

2 MR. DAWSON: A. Maybe just one other
3 thing to add, though, is that I think the production of
4 dioxins and furans will depend on having halides
5 available; and at that point, you burn and distillate
6 oil which would be very low in terms of chlorine and
7 fluorine, so I think the chemicals are available to a
8 much lower degree under those circumstances to produce
9 furans and dioxins.

10 Q. Let me then turn to page 51, which
11 refers -- I want to refer specifically to section
12 5.2.1. And just to reiterate perhaps what was said
13 earlier, I take it that the health impacts of
14 processing, extraction and so on out of Ontario is not
15 a matter of concern for Ontario Hydro; is that correct?

16 DR. EFFER: A. I think the statement
17 that Mr. Smith has made two or three times still
18 stands. We are concerned but we don't have
19 responsibility.

20 Q. Fair enough.

21 I would like now to turn to section 6 of
22 this report over at page 81.

23 THE CHAIRMAN: What page?

24 MR. M. CAMPBELL: Page 81, section 6,
25 "Impact on Human Health".

1 Q. In the second paragraph under section
2 6.1, "Introduction", you refer to the index in terms of
3 fatalities per gigawatt-year of electricity produced.
4 When you say fatalities, does that also include
5 disease, accidents and so on, non-fatal occurrences, or
6 is it limited to fatalities?

7 [4:45 p.m.]

8 A. I can't go beyond what it says there,
9 I am afraid, and it says there impacts which is a
10 fatality or risk of fatalities.

11 Q. If you look at the very last sentence
12 on page 81 it refers to the Porter Commission reported
13 that mining of coal operating at a certain percentage
14 of capacity could result in approximately .7 to 7
15 worker fatalities per gigawatt year, and then they list
16 15 to 75 worker injuries or disabilities due to
17 accidents and black lung disease, I take it --

18 A. I am sorry, where are you now?

19 Q. I am sorry. At the very, very bottom
20 at page 81 where it refers to the Porter Commission and
21 then over the page to page 82.

22 Porter refers to .7 to 7 worker
23 fatalities per gigawatthour per annum and 15 to 75
24 worker injuries or disabilities due to accidents or/and
25 black lung disease.

1 Would it be a correct interpretation that
2 fatalities then are limited to fatalities alone and
3 accidents and disabilities are included in some other
4 formula?

5 A. When it says worker fatalities I
6 assume that that means all fatalities, if I may make an
7 assumption here.

8 Q. Let's look then at figure 6.1 on page
9 83 which is titled Summary of Health Impacts, Fossil
10 Generation. On the basis of what you have just said,
11 would it be fair to say that the health impacts listed
12 here do not include accidents and non-fatal diseases?

13 A. Occupational fatalities, I believe,
14 do include accidental deaths.

15 Q. But non-fatal accidents, non-fatal
16 diseases, are they included in this summary of health
17 impacts?

18 A. Non-fatal, no.

19 Q. They are not included?

20 A. They are fatalities.

21 Q. And that's both for worker and
22 public; is that correct?

23 A. Yes.

24 Q. And so to that extent the summary of
25 health impacts is not complete in that they do not

1 include non-fatal accidents, non-fatal diseases?

2 A. That is correct.

3 Q. And in addition, the extraction
4 portion of this summary for coal, oil and natural gas,
5 I would take it that most of the extraction takes place
6 out of Ontario; is that correct?

7 A. Outside Ontario, yes.

8 Q. Outside Ontario?

9 A. Yes.

10 Q. And I would also assume that the bulk
11 of the transportation also takes place outside of
12 Ontario, a small portion in Ontario, but the bulk
13 would --

14 A. Correct.

15 Q. I would like to focus then on the
16 operation side, which is the bottom portion of that
17 figure for a moment.

18 Now, in connection with the oil
19 operation, under the heading Public Fatalities there is
20 a reference to 0-13 and then a little 'b' beside it,
21 and then (SESEEE).

22 The 'b' I take it refers to the footnote
23 which is below premature deaths; is that correct?

24 A. Yes.

25 Q. And could you explain to me what that

1 footnote means in layman's terms?

2 A. This particular plant is producing
3 sulphur dioxide which is being related to reduction in
4 life expectancy, and that operation of the plant will
5 produce that rate of deaths, premature deaths due to
6 the operation of the plant, and the statistical
7 analysis gives that degree of confidence in the result
8 that's being obtained.

9 Q. And 80 per cent confidence interval
10 of 0 to 10, what does that mean?

11 A. I don't know.

12 Q. And you say the base power plant is
13 assumed to have a 305 metre high stack. Is that an
14 Ontario-based power plant, or is that some other --

15 A. These data are from widely separated
16 places and do not apply necessarily to Ontario.

17 Q. Is there a stack in Ontario which is
18 305 metres high? I am just curious.

19 A. In Sudbury, yes.

20 Q. The footnote C, stack height equals
21 305 metres, 2.2 million people in a radius of 80
22 kilometres. That's not Sudbury, surely.

23 A. As I say, these data are from the
24 literature and are not necessarily -- not pertaining to
25 local conditions. They are just acquired from the

1 general literature where it's available.

2 Q. The summary of health impacts set out
3 in figures 6.1 refers primarily to sulphur dioxide
4 emissions; is that correct? Health impacts which
5 result from sulphur dioxide emissions?

6 A. The operation of a fossil-fueled
7 plant, because we are talking about extraction and
8 transportation here.

9 Q. I am sorry, I should have limited my
10 question to the operation component.

11 The reason I referred to sulphur dioxide
12 is the reference in footnote B to .5 kilograms of
13 sulphur dioxide, and I am assuming that we are relating
14 the health impacts which arise from the emission of
15 sulphur dioxide; is that correct?

16 A. The stress in the footnotes on
17 sulphur dioxide emissions indicates that the primary
18 effects are due to sulphur dioxide.

19 Q. Can we go over to figure 6.5, which I
20 believe is page 93. We are back to trace elements and
21 trace organic species. I just refer to that list.

22 Would the presence of arsenic, beryllium,
23 trace organic species and so on, be included in the
24 sulphur dioxide emissions listed in figure 6.1, or is
25 that an entirely different set of emissions?

1 A. I would have to know what the basis
2 for the specific study was. In some cases they may be
3 using medical records which are based on experiments
4 with people to sulphur dioxide alone. I don't know
5 what the basis for that calculation is.

6 Q. So then if I can just take a very
7 brief summary, figure 6.1, the summary of health
8 impacts does not include non-fatal accidents, non-fatal
9 diseases, and you are not aware, or do not know whether
10 it includes references to the trace elements and the
11 trace organic?

12 A. That's correct.

13 Q. I would like to go back, if I may, to
14 pages 85 and 86, and ask you whether or not under the
15 heading 6.4.1, Construction Coal, if you would see
16 additional occupational health and safety concerns
17 respecting asbestos exposure or noise and a consequent
18 hearing loss or skin problems in the handling of coal?

19 A. I believe these occupational
20 fatalities have been concerned with the construction
21 and not due to the exposure of workers to those
22 elements.

23 THE CHAIRMAN: I am sorry, I didn't hear
24 the last part? Not due to?

25 DR. EFFER: Are not due to the exposure

1 of workers to noise and asbestos as Mr. Campbell has
2 mentioned.

3 THE CHAIRMAN: Mr. Campbell, I hate to
4 interrupt, but do you think you would finish in ten
5 minutes?

6 MR. M. CAMPBELL: I very much doubt it,
7 sir.

8 THE CHAIRMAN: I think rather than put
9 you under any pressure, I think that we should stop and
10 continue tomorrow morning.

11 MR. M. CAMPBELL: Thank you, sir.

12 THE CHAIRMAN: We will adjourn now until
13 tomorrow morning at ten o'clock.

14 THE REGISTRAR: Please come to order.

15 This hearing will adjourn until ten o'clock tomorrow
16 morning.

17 ---Whereupon the hearing was adjourned at 4:50 p.m. to
18 be resumed on Tuesday, February 25, 1992, at 10:00
a.m.

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E R R A T A
and
C H A N G E S

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<u>Page No.</u>	<u>Line No.</u>	<u>Discrepancy</u>
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vi + 15449	Exhibit 367.79 s/r Interrogatory No. 6.2.223.
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vi + 16281	Exhibit 367.125 s/r Interrogatory No. 6.2.239.
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